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IAEA-TECDOC-1917

Assessing Behavioural Competencies of Employees in Nuclear Facilities

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ASSESSING BEHAVIOURAL COMPETENCIES OF EMPLOYEES IN NUCLEAR FACILITIES

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA, 2020

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FOREWORD

The nuclear sector, owing to its well defined standards, technological complexity and ongoing safety and security considerations, places unique demands on its workforce. As such, attracting and retaining qualified staff who can fulfil expected performance and behavioural requirements is fundamentally important, particularly for those in safety-critical positions.

A variety of factors need to be assessed to identify individuals who can perform at the expected level in a highly regulated work environment. Beyond their educational and technical qualifications, individuals in the nuclear workforce need to possess compatible ethics, values and attitudes, and be of optimal mental, emotional and physical fitness to complete their tasks. In addition to routine activities, these individuals need to be able to respond to emergency situations, with the capacity to make decisions and take appropriate action. To select personnel who meet such requirements and are well suited to their work, it is necessary to understand the psychological demands of the various roles and responsibilities of personnel employed throughout the nuclear sector.

The topic of behavioural and competency assessment is increasingly relevant for human resource development in Member States with nuclear power programmes. For embarking and newcomer countries, an understanding of the considerations and challenges involved in the initial buildup of a nuclear workforce is necessary. For countries with active nuclear power programmes, efforts to maintain a competent and sustainable workforce in the longer term are necessary, given challenges such as a limited supply pool, facility lifetime extensions and decommissioning.

Following the recommendations made by Member States at the 2012 and 2014 meetings of the Technical Working Group on Managing Human Resources in the Field of Nuclear Energy, this publication was developed to provide information and present a practical approach to assessing behavioural competencies throughout the nuclear employee life cycle. It outlines a variety of tools and approaches that can aid the behavioural assessment processes and provides both general and role specific information to improve the quality of selection, promotion, training and development decisions. This information can be used by Member States as a foundation upon which to develop or improve a comprehensive behavioural competency assessment programme and contribute to building a sustainable nuclear workforce comprising high performing nuclear professionals.

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CONTENTS

1 INTRODUCTION

1.1 BACKGROUND

The impact and effectiveness of all organizations in the nuclear sector including power generation, regulators and research and development entities depend heavily on the performance of the people who occupy both safety-critical and non–safety critical roles. The ability of these organizations to select and appoint the right people into the right positions influences performance at every level: individual, team and organizational.

The extent to which nuclear technology can achieve its potential of contributing to peace, health and prosperity throughout the world ultimately depends on the availability of competent, qualified and capable human resources. The nuclear industry places very rigorous demands on such resources due to the complexity of the technology and the need for constant safety vigilance. It therefore requires highly educated and trained staff to meet the highest standards of performance and conduct. These requirements apply across the full range of nuclear activities and facilities, from nuclear new build programmes, facilities in routine operation through to decommissioning and waste management entities. The workforce involved across this spectrum of activities needs to be able to carry out, from a mental fitness for duty position, both routine activities and respond to emergency situations. These requirements make it vital that the psychological demands of the roles and responsibilities of personnel employed throughout the nuclear sector are fully understood and managed to enable safe and reliable operation. This topic has become increasingly significant for both newcomer countries involved in building up their workforce requirements, and for Member States with ongoing nuclear power programmes who face the challenge of a limited workforce supply pool and yet the need to manage facility lifetime extensions and the decommissioning process.

1.2 PURPOSE

This publication provides guidance and recommendations to nuclear organizations with a practical approach to assessing the behavioural competencies for safe, secure and effective performance across the nuclear workforce. It includes the consideration of the requirements necessary from pre–employment to off–boarding. It addresses behavioural assessment principles, practices and tools that can be applied at various stages of the employee life–cycle with the aim of improving the quality of selection, promotion, training and development decisions. Also outlined in the publication are challenges, key issues and critical considerations for assessment practices.

For some Member States, the proposed practices, tools and techniques may already form part of existing selection, training and continuous evaluation processes. In such instances, these guidelines will provide a basis to review the strength of existing practices and identify potential areas for improvement. Other Member States for which some of the concepts may be new or unfamiliar will benefit from the practical nature of this publication, and be able to use it as a foundation upon which to develop sound assessment practices to identify and assess behavioural requirements for safe and effective performance. The target outcome is an assessment process that:

— Establishes whether there is a suitable person–role fit and person–environment| organizational culture fit for high engagement and performance;

- Ensures that individuals employed by the facility have the behavioural competencies to perform their role and associated tasks/activities in a safety–critical context;
- Facilitates the early detection of individuals who are not fit to perform critical duties;
- Provides reasonable assurance that individuals are trustworthy and reliable;
- Identifies any conditions that could hinder an employee's ability to competently and safely perform the duties of their position or adversely affect their ability to safely and competently perform their duties.

1.3 SCOPE

This publication is applicable to human resource management in all nuclear facilities, including nuclear power plants and nuclear fuel cycle and waste management facilities, and across their entire life cycle including siting, designing, constructing, commissioning, operating, modernizing and decommissioning. Approaches, guidance, advice and good practices provided in this publication apply to both established nuclear programmes and countries that are considering the introduction of nuclear programmes.

It is recognised that there are many factors that affect how standards and recommendations may be realised and managed in practice. These guidelines may be adapted to match the needs of specific local requirements through a process of contextualisation, which requires that assessment practices take into account the context within which they are applied, that is the local circumstances that may inform and guide the determination of appropriate practices. These contextual factors have to be considered when interpreting the guidelines and defining what they would mean in practice. A graded approach, commensurate with risk, may be defined and used when considering guidance about practices during the employee life cycle. The use of a graded approach enables the application of requirements based on contextual organizational factors and particular characteristics of the facility or activity.

Factors at the local level that need to be considered are: social, economic, political, legislative, institutional, linguistic and cultural differences. The legislation of the country in which assessments take place as well as existing national guidelines and performance standards set by professional psychological associations and other relevant standard setting organizations may need to be considered.

It is anticipated that the primary users of this guide will be those managers and personnel responsible for ensuring that the staff employed in nuclear facilities are competent to perform their tasks and activities, are capable to achieve expected performance standards and can be relied on to fulfil their roles and responsibilities in accordance with specified rules and regulations. Specifically, this will be relevant to:

- Those who make staffing or employment related decisions;
- Those responsible for conducting assessments and determining how these will be used;
- Those who administer, score or interpret any assessments;
- Those who provide advice to others based on results of the assessments (e.g. recruitment consultants, human resource practitioners, career counsellors, trainers);
- Those concerned with the process of reporting results of the assessments and providing feedback.

2 GENERAL RECOMMENDATIONS FOR BEHAVIOURAL ASSESSMENT: PROCESSES AND PRACTICES TO ASSESS, IDENTIFY, SELECT AND RETAIN A NUCLEAR WORKFORCE

2.1 INTRODUCTION – CHARACTERISTICS OF A NUCLEAR WORKFORCE

The nuclear industry is characterised by highly defined structures, complex technology, high performance standards and a high degree of formalisation and standardisation (rules, procedures and standardized methods for routine activities as well as unusual occurrences). This places rigorous demands on staff employed in nuclear facilities, especially on those personnel who occupy roles or perform activities that have a direct bearing on safety and security [1].

Attracting, selecting and retaining the right staff who can achieve expected performance standards is therefore key to nuclear safety, security and overall organizational performance in both existing facilities and to support planned expansion [1]. Various safety requirements highlight the importance of attracting and retaining suitable staff who have the right ethics, values and attitude and are suited to working in a highly regulated environment with a strong safety culture. Organizations need to ensure that they select individuals whose attitudes, values and ethics are consistent with the requirements for working in the nuclear industry and who have the appropriate qualifications for the identified positions [1].

Nuclear facilities have material, equipment and information the safety of which can be compromised through, for example, the release of sensitive information or infrastructure sabotage. Inappropriate actions taken by staff in critical roles can also have negative consequences. There are many tasks in which the optimal mental and emotional state and competence of an individual is required, without which there could be not only an impact on the safety of the task being conducted but may have wider reaching ramifications whereby the organization's ability to provide services safely, securely and effectively is compromised. Poor decision making can put others in danger, risk the health of personnel employed at the facility or even have serious consequences for the community at large. Maintaining a safe nuclear facility therefore includes ensuring all individuals are assessed as capable of completing their assigned tasks safely, without error and taking appropriate action if seen otherwise. A thoroughly prepared workforce is fundamental to ensuring a safe nuclear facility.

2.1.1 Factors influencing individual performance

Whilst the safe operation of a nuclear organization is formalized through its management systems, its safe and effective organizational performance is dependent on the actions of individuals and teams i.e. human behaviour, which in turn is influenced by a number of organizational factors, for example, the structure of the organization, operational and management systems, leadership behaviour and organizational culture. The degree of alignment between the organization's strategy, systems, structure and culture will impact the effectiveness and efficiency of the organization and the achievement of strategic, operational, safety and security goals.

McKinsey's 7S Model of organizational effectiveness was developed to illustrate how seven elements of the organization: Structure, Strategy, Skills, Staff, Style, Systems, and Shared values, need to be aligned to achieve organizational effectiveness and highlights a systemic approach when assessing and improving performance. Table 1 is based on the McKinsey model [2].

TABLE 1. MCKINSEY'S 7S MODEL

7S Element	Description
Strategy	Strategy is the plan of the organization to execute its purpose and achieve longer–term strategic objectives.
Structure	Structure represents the way business divisions and units are organized, reporting relationships, roles, responsibilities and accountabilities.
Systems	Systems are the processes and procedures of the organization and includes operational and management processes. These determine how business is conducted, how daily activities are performed and how decisions are made.
Shared values	Shared values are the norms and standards that guide organizational behaviour, actions and decisions. Values are central to the development of all the other critical elements.
Style of Leadership	Style represents the way in which the organization is managed and led: how leaders, interact, the actions they take, the decisions they make and the behaviour they demonstrate on a daily basis.
Skills	Skills include the technical and behavioural competencies and capabilities to perform effectively.
Staff	Staff element is concerned with number and type of employees an organization has and how they are recruited, trained, motivated and rewarded.

This systemic approach takes into account the impact of and interactions between multiple factors on behaviour. It recognises that addressing performance at the individual level will not necessarily result in safe, secure and effective operations unless other factors are effectively aligned to create a work environment that enables and supports individual performance. These other factors can be at the organisational level (e.g. safety culture, management and operational systems, staffing, equipment), team level (e.g., team roles and responsibilities and team processes) and individual level (e.g., job design and performance management).

2.1.1.1 Organizational factors/variables

Organizational factors include effective supervision and oversight, simple and easy to use procedures, an organizational culture that reinforces and rewards the right behaviour, and a management system that supports and facilitates the right behaviour. These factors need to be in place to enable workers to make correct decisions and act appropriately. Consequences of failures at the organizational level include:

- *Organizational strategy*: lack of clarity or ineffective;
- *Structure*: misaligned and conflicts with organizational culture;
- *Operational and Management Systems*: unreliability of systems, process inefficiencies, ineffective procedures;
- *Style of leadership*: incongruence between organizational values and management behaviour; style of leadership which may inhibit the behaviour of the employee;
- *Resources*: tools and equipment inadequate or unavailable.

2.1.1.2 Team level factors/variables

Individuals typically form part of a team and the ability of the team to work collectively and across organizational boundaries affects organizational performance as a whole. Examples of factors at the team level which may impact organizational performance include:

- Clarity of the team's purpose, goals, roles and responsibilities, as well as their alignment with organizational goals;
- Common guiding principles and ways of working, which may be functional or dysfunctional, competitive or collaborative, supportive or unhelpful;
- Collaborative working capabilities: collective thinking, problem–solving and decision–making, communication and conflict resolution;
- Connection, engagement and relationships within the team and across organizational boundaries, interaction with internal and external stakeholders;
- Collective accountability: shared ownership for team and organizational results.

2.1.1.3 Individual factors/variables

Various nuclear industry standards publications and documents outline behavioural requirements for nuclear professionals. Personality attributes such as rule compliance, critical thinking, questioning attitude and safety consciousness are reflected in the requirements for nuclear professionals as specified by the Institute of Nuclear Power Operations (INPO) [3]. Essentially nuclear professionals are:

- Rule abiding and comply with safety regulations and procedures: use and follow procedures and other work documents as intended;
- Safety conscious and aware of potential hazards, risks and threats that may impact individual and organizational safety;
- Critical thinkers, who have a strong questioning attitude enabling them to identify potential weaknesses, risks or threats to safety, anticipate error–likely situations that could affect equipment performance or personnel safety;
- Intolerant of any safety and security risk, error–likely situations and organizational weakness;
- Competent in and using error prevention human performance tools: such as self–checking, task review, situational awareness, three–way communication;
- Assertive communicators, willing and capable of reporting risks, threats and deficiencies in processes, practices, policies or procedures in the workplace;
- Capable of prompt response/action to incidents or events;
- Motivated to learn: from operating experience and best practice, initiating continuous improvement to the task and work environment, and improve personal capabilities;
- Willing to take ownership and responsibility for their behaviours.

When an individual does not meet the required performance standards or fails to comply with safety and security regulations it may be due to a number of organizational factors that are external to the individual. It is important to diagnose performance problems systemically in order to identify factors external to the individual that may be preventing the right behaviour and the achievement of required performance standards. Once external factors have been assessed, factors at the individual level can then be explored. Examples of factors at the individual level which may produce performance gaps include:

- Skill deficiency;

— Knowledge deficiency;
— Lack of motivation or drive to perform;
— Inattention, lack of focus or concentration due to mental or emotional state;
— Physical health;
— Emotional health/well–being;
— Self–esteem/self–confidence;
— Behavioural style, e.g. how an individual relates to others, processes information approaches work tasks.

A summary of the potential factors at the individual level which may impact an employee's performance is shown below in Fig. 1.

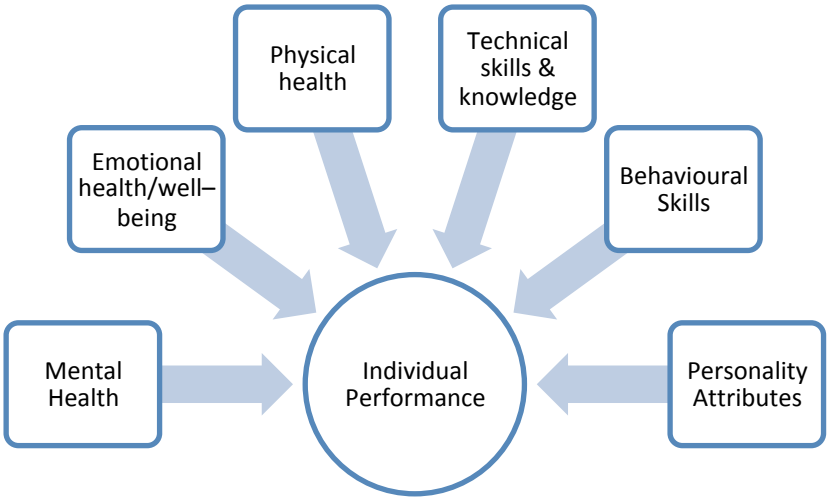

FIG. 1. Individual factors impacting performance

2.1.2 The impact of personality on work performance

Personality can be defined as the unique characteristics, attributes or traits that distinguish one person from another and which drives the way they think, feel and behave [4]. It influences work behaviour: thinking styles, interpersonal styles, decision making styles, emotions and feelings and can influence daily choices, decisions and actions. The structure of personality can be reliably defined, described and measured and there is a large body of research that supports the link between personality traits and work behaviour. There are many personality theories, each emphasising different aspects of personality and proposing different methods of assessment and measurement. However, most agree on the key aspects of personality being, that is [4–6]:

— Shaped by both genetic and environmental factors: while many personality traits are generally inherited, the expression of personality in day to day behaviour may be influenced by a number of contextual or situational factors;
— Although people may react differently in different situations, personality is regarded as relatively stable and enduring over time;
— The structure of personality can be described and measured**;**
— Personality influences work behaviour; thinking styles, interpersonal styles, decision–making styles, emotions, feelings, daily choices, decisions and actions.

2.1.2.1 Understanding personality using the behaviour iceberg analogy

Personality can be understood through the iceberg analogy which reflects the multi–faceted nature of personality and the various aspects that need to be considered when describing, assessing or measuring personality, namely [7]:

- *Temperament*: This refers to the emotional aspects of an individual's personality, for example, attention span, quality of mood, emotional intensity and regulation of emotional reaction;
- *Motivation*: This reflects an individual's interests, desires and aspirations, those aspects that energise behaviour and produces action; motivations can be enduring or can exist merely in the short–term. Examples of motivators include a sense of belonging, achievement, status and influence;
- *Values*: This can be thought of as guiding principles that influences behavioural choices and decisions in different situations. Values can operate consciously and unconsciously and are shaped through experiences in early childhood, societal norms and significant others;
- *Attitudes*: This is an orientation towards something which can either be positive or negative and either implicit or explicit; a positive or negative attitude will influence energy, attention and action;
- *Beliefs*: These are assumptions or fundamental views which an individual believes and which can influence his or her perceptions and actions. Beliefs and assumptions drive behaviour and can produce either functional and effective behaviour or dysfunctional and ineffective behaviour;
- *Abilities*: This refers to the skills and capabilities that enable an individual to perform mental or physical tasks.

The behaviour iceberg analogy illustrates that there are a number of factors which influence behaviour, and personality attributes that influence how individuals express behaviour in the work context, as shown in Fig. 2. In order to understand an individual's behaviour and gain insight into the drivers and motivators, it is important to 'dig beneath the surface' and move beyond the visible – behaviour that can be seen and heard – and move below the surface to those aspects of personality that underpin behaviour and influence thoughts, feelings, emotions and actions.

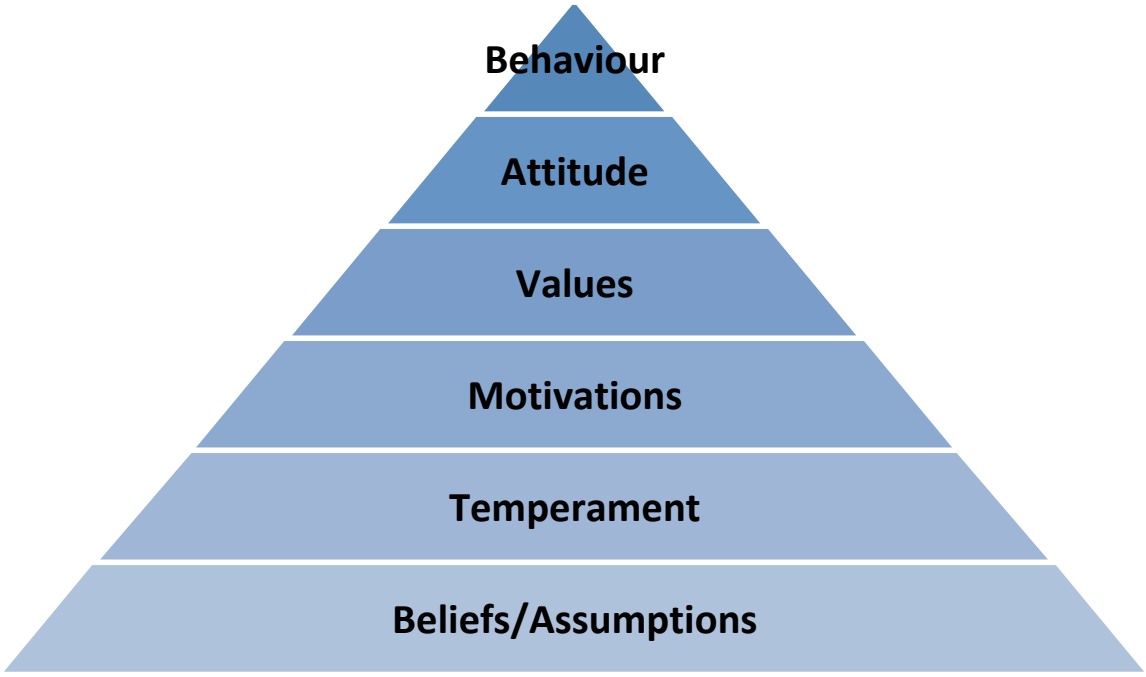

FIG. 2. The behaviour iceberg

In summary, the behaviour iceberg conveys the following key concepts about individual behaviour:

- Personality attributes influence behavioural patterns; what people say and do, how they relate to others, how they perform tasks, how they deal with conflict, how they make decisions and how they approach their tasks;
- Personality is expressed through behaviour (actions and words); it is visible and can be observed by others;
- Visible, observable behaviour is influenced by a number of invisible, less tangible factors, for example:
  - Attitude: negative or positive disposition towards rule compliance;
  - Skills: technical and behavioural skills, e.g. ability to interpret an operating procedure and communicate operating instructions clearly and concisely;
  - Knowledge: of safety rules, regulations, processes, procedures;
  - Personality attributes and style preferences: thinking and interpersonal style preferences;
  - Emotions: feelings about ourselves, the situation and experiences;
  - Beliefs or assumptions about the way things work;
- Values and motives – what is perceived as important – will influence drive, motivation, attention and action;
- Emotional, mental or psychological state can impact cognitive processes (how information and experiences are processed and interpreted) and can influence actions and the decisions made;
- Beliefs and assumptions (which can either be conscious or unconscious) about self, others, the organization and the environment influences daily behaviour. A disconnect between beliefs and actions will result in short–lived, sporadic behavioural changes and an inconsistency in our day to day behaviour.

Any or all of these variables can influence behaviour either positively or negatively and if the latter, could contribute to failure to meet performance requirements. Potential problems if ineffective assessment techniques are not applied are:

- Selecting someone who does not have the personality attributes or characteristics to work in a highly regulated environment could lead to failure to achieve performance standards and human error;
- Stress, fatigue or personal trauma which could lead to a lack of focus and attention and failure to follow procedures when performing safety critical tasks;
- Selecting and appointing individuals who are not trustworthy, may misuse technology, disregard rules, have deliberate intent to sabotage the operation.

An organization's ability to identify and select personnel with the requisite knowledge, skills, abilities, attributes and attitudes to perform their job is a key requirement to achieve nuclear safety, security and performance [8]. A systematic and robust assessment of behaviours will enable the organization to make more informed decisions about competence throughout the employee life–cycle by selecting, promoting and developing staff that have both the technical and behavioural competencies to perform roles that are critical to the safe, secure and reliable operation of a nuclear facility.

2.1.3 Relevance of behavioural assessments

Working in a highly regulated environment with a strong safety culture [1] requires personnel who have the right ethics, values and attitude to be safety conscious, and who are suited to complying with rules, procedures and uncompromising standards and coping effectively with work pressures and demands [9].

Personality influences behavioural patterns: what people say and do, how they relate to and interact with others, how they process information and how they perform tasks [4]. For example, one person may start on tasks early and approach them in a systematic and methodical way, drawing up detailed plans before commencing, while another may be prompted more by pressure, starting closer to the deadline with less planning and forethought, preferring to let the strategies emerge as they proceed. One individual may decide issues quickly and base their decisions on a logical analysis of the facts, while another may reflect on the issue at length and place emphasis on the impact of the decision on relationships and harmony.

Decision–making style, interpersonal style, influencing tactics, conflict style and learning style are all examples of personality attributes and behavioural preferences that influence an individual's actions, interactions and decisions. Research also indicates that when there is alignment between an individual's behavioural style and their work environment and organisational culture, employees will be more satisfied, motivated, productive and effective [4]. When there is a natural person–role and person–work environment fit, individuals may experience less stress and can focus their energy on achieving job performance requirements, while an individual whose behavioural style is less of a fit, needs to significantly adapt their behaviour to fit the work environment and continuously focus their energy on adapting their behaviour which reduces the energy available for the completion of work tasks [4].

The recruitment, selection, promotion and development of staff that have the right behavioural and technical competencies will impact engagement and performance. Over the long term the expected benefits of excellent human performance include a reduction in the number and consequences of significant events and improvement in quality and safety amongst others [8]. Many member states have rigorous assessments to determine the technical

abilities of their workforce, however their approach to assessing behavioural competencies is less structured or robust.

The early identification of factors which may affect individual performance is encouraged in order to prevent the potential negative impact on task and organisational performance. While it is important to create an environment that encourages and supports self–assessment and voluntary self–disclosure of any problem that may have a potentially detrimental effect on performance, there are a number of barriers that may stop or prevent personnel from voluntary self–disclosure:

- Potential negative impact on career mobility or future employability;
- Fear of potential disciplinary action;
- Loss of competency accreditation, authorisation or licence to operate;
- Stigma associated with mental illness;
- Financial implications.

This publication provides guidance on the development and implementation of a structured and systematic approach to behavioural assessment that will enable nuclear facilities to appoint personnel who are able to fulfil their role and responsibilities and can be relied upon to consistently and competently perform their tasks, complying with all the relevant safety rules and regulations and performance requirements. The suggested assessment process, practices and tools will help to provide ways to assess, identify and select individuals who have the behavioural competencies for high engagement in a nuclear work environment and are competent in performing their role and assigned tasks activities. Proposed assessment practices will also help to facilitate the early detection of any physical, mental or emotional condition which may hinder an individual's ability to competently and safely perform the duties of their position.

2.2 IDENTIFICATION OF CRITICAL ROLES, TASKS AND ACTIVITIES

Valid, reliable and objective assessment of competence starts with the identification of critical safety and security roles or tasks. A robust and rigorous assessment needs to define those roles and associated tasks in which the physical, mental and emotional health and behavioural capabilities of an individual can have an impact on the safety or the security of the facility. An analysis can commence with a process, job or task review followed by a risk assessment to determine safety critical roles and tasks.

Risk assessment includes an analysis of the potential for human error and the associated safety consequences. A robust and systematic risk assessment considers:

- Tasks or activities performed during all modes of operation including normal process operation, abnormal operations, planned and unplanned maintenance and emergency conditions;
- Activities that may directly or indirectly contribute to a significant incident;
- Any task where sub–standard performance could contribute to an event, incident or major accident;
- All job roles or categories of staff that may be involved in the planning or execution of safety critical activities;
- Task complexity/difficulty and the potential consequences for safety and security;
- Frequency of actions that could cause or contribute to a significant incident;

— Tasks that require the use of equipment or personal protective equipment as this is known to add additional physiological or psychological stress;
— Factors that can have a potentially negative impact on employee health and contribute to work related stress, e.g. demand – workload, work patterns, work environment, control – how much influence a person has in the way they do their work [10, 11].

Typical activities which form part of a risk assessment process include those shown in Fig. 3:

— Identification of safety critical systems and processes;
— Determination of safety critical roles, tasks and activities;
— Evaluation of risks and prioritize roles and activities.

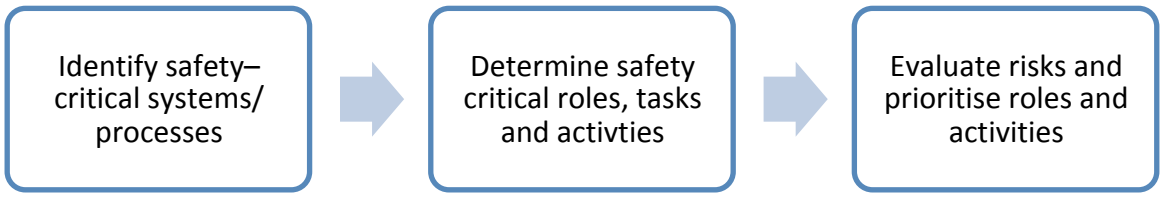

FIG. 3. Key activities which form part of the risk assessment

Key questions to guide the identification of safety critical systems, critical roles, tasks and activities are detailed below:

— The identification of safety critical systems/processes include the following:
  - What are the safety critical processes and systems?
  - Which elements are dependent on human performance?
  - Which activities if not performed correctly can contribute to or cause an event, incident or accident?

— The determination of safety critical roles, tasks and activities include the following:
  - To which job families do these activities belong?
  - To which roles do these activities belong?
  - Which tasks are associated with specific psychological demands?
  - Which tasks pose a threat to safety or security if the operator is incapacitated?
  - Which tasks, if not performed correctly, could have potential negative safety consequences?
  - What is the level of task complexity?
  - How frequently are these tasks performed?
  - What is the potential likelihood and consequence of these risks for the employee, the organization and the community?

— The evaluation of all the identified risks, identification and prioritization of security and safety critical roles includes the following:
  - Which roles have the highest potential safety and security risks?
  - What are the safety critical roles?
  - What are the high, medium and low risk activities?
  - Is a combination of lower risk activities contributing to create a higher risk?

The output from the risk assessment is captured and documented (example of risk assessment template provided as Annex I.

Roles typically identified as safety–critical include the following [11]:

- Roles requiring certification to perform work on safety–critical systems or equipment;
- Licensed nuclear reactor operators;
- Security personnel: Nuclear Security Officers (NSOs), onsite nuclear response force (NRF) members, and designated non–NRF personnel;
- Safety related roles that have minimum staff complements;
- Critical roles identified via the risk assessment.

Risk assessments and risk informed approaches play a critical role in ensuring both the safety and security of nuclear material and facilities. Additional information is available from the IAEA's Nuclear Security Series and International Nuclear Safety Group.

2.3 CONDUCTING A JOB AND TASK ANALYSIS TO DETERMINE THE KEY BEHAVIOURAL REQUIREMENTS FOR EFFECTIVE PERFORMANCE

A thorough understanding of the role and the performance requirements for the job holder is an essential prerequisite for the identification of the personal qualities, skills and abilities individuals will need to be effective. A rigorous analysis to identify critical roles and associated tasks therefore needs to be followed by a comprehensive job and task analysis to determine the performance requirements of a position and the competence requirements (skills, knowledge, and attributes) for employees in these positions.

Once the risk assessment has been completed and the critical roles have been identified, a job and task analysis identify and define the competency requirements. Job and task analysis tools are used to identify the factors that are most critical to successful job performance, understand the context within which behaviour takes place in, and the degree of complexity or level of difficulty in executing tasks. Successful performance will be influenced by a number of factors including personal characteristics (attributes, disposition, attitudes), particular skills that have been developed over time, knowledge and experience, energy levels, ways of thinking or problem–solving and interacting with others. This information is ultimately used to identify and define the competency requirements (skills, knowledge, abilities and personality attributes) for successful job performance and determine the critical requirements for secure and safe performance.

Job analysis is a systematic process using verified job analysis tools to identify in detail the tasks, duties and responsibilities associated with particular jobs. The output of a job analysis is a comprehensive list of the responsibilities and the high-level tasks or activities that need to be performed in order to fulfil each of the key responsibilities.

Task analysis is used to divide tasks or activities into sub–tasks and is typically used to analyse more complex roles and associated activities. Tasks need to be decomposed to a level that enables the identification and development of competency requirements i.e. the skills, knowledge and attributes needed to perform the task/activity, for example:

- *Skills* (technical and behavioural skills): the ability to interpret a procedure, diagnose faults, communicate work instructions, supervise contractor staff;

— *Knowledge* (underpinning knowledge): understanding of the risks associated with maintaining and operating a plant and knowledge of the correct procedures and safety-related practices;
— *Attributes* (personality attributes associated with safety behaviours): vigilant in rule compliance and adherence, questioning attitude, ask questions that triggers critical thinking about potential risks and hazards.

The output of a task analysis is a detailed competency–based job profile (see Annex II).

The combined outputs from the job and task analysis provide a good understanding of the performance requirements of the role. This provides a sound basis to establish the behavioural competency requirements.

In summary key activities in the job and task analysis process include:

— Identification of key responsibilities or key areas of performance;
— Listing the key tasks and activities that need to be performed in each of the areas of responsibility;
— Identifying the required standards of performance: these are specific, objective and measurable performance indicators or criteria that are essential to job performance;
— Identifying the competencies that are essential to meet performance standards and requirements;
— Capturing the outputs generated in a competency–based job profile.

There is a range of techniques to develop a rigorous and robust job and task analysis process. Examples of these techniques include [12]:

— Job analysis questionnaires (see Key Questions for Job and Task Analysis below);
— Interviews with top performing job incumbents to get an insight into behavioural competencies that result in high performance;
— Focus groups (facilitated discussions with a range of stakeholders who have insight into the role, those who interact with the role and present job incumbents);
— Desk–top analysis of existing information (e.g. procedures, work instructions, quality manuals);
— Observation of existing job incumbents performing the activities/tasks;
— Interviews with a range of job incumbents, line managers, customers, stakeholders;
— Critical Incident Technique (interviews that focus on identifying behaviours that lead to high performance in critical situations or incidents) [13].

The output of the job and task analysis is recorded in the competency–based role/job profile and reflects the performance requirements of the job. Assessments need to be based on the specific and well–defined criteria that are essential to job performance. The performance criteria are matched with reasonable physical and psychological requirements for an employee in that position and detailed in the competency–based job profile. A sound analysis clearly demonstrates the link between competencies and effective performance in the target job. Annex 3 provides a detailed checklist and key questions for job and task analysis.

The full range of competencies required for successful job performance need to be specified and will include:

— *Core competencies*: These are competencies that are common to all the jobs within a particular organization, organizational unit or industry and are essential to the

organization's operational and strategic requirements, for example radiation protection management, nuclear fuel management, procedure use and adherence;

- *Technical or Operational competencies*: These are the competencies that are typically required to perform a job within a job family and are specific to the discipline area or field of expertise. They are often technical or operational in nature, for example maintenance, quality assurance, and inspection and testing;
- *Behavioural competencies*: Any personality attribute or competency which contributes to an individual's successful performance of task. This includes knowledge, skills set and personality characteristics that influence how a task is performed and how the required performance standards are achieved. Behavioural competencies typically include interpersonal behaviour, information–processing and decision–making;
- *Management and Leadership competencies*: Management and leadership competencies are those specific attributes and capabilities that are important to management and leadership effectiveness. Examples of typical competencies: planning and organizing, delegation and control, coaching and developing others, influence and impact, motivating and inspiring others.

Alignment with the following guidelines will ensure that the competency profile is value–adding, pragmatic and effective [14]:

- Include only measurable components;
- Restrict the number of competencies to 12 (preferably fewer);
- Cluster the competencies to make the framework easier to work with;
- Provide definitions and/or examples of each competency;
- Consider relevant employment legislation (for example diversity and inclusion to ensure that none of the required competencies unfairly discriminates against any existing or potential employees).

2.4 IDENTIFYING AND SELECTING SUITABLE ASSESSMENT METHODS/TOOLS TO MEASURE THE KEY COMPETENCIES THROUGHOUT THE EMPLOYEE LIFE–CYCLE

An assessment in this context is any test or procedure designed to measure or gather data and information about an individual's knowledge, skills, behaviour or personality traits in order to make a judgment about their competence, potential or performance. This includes résumé evaluations, reference checks, interviews, work sample tests, general ability tests, specific ability tests, physical ability tests, personality inventories, assessment centres, drug tests, medical tests and observations.

2.4.1 Establish the purpose or intended use of the assessment

An assessment is a data-based process. Behavioural assessments are used to gather data concerning behaviour and the factors that influence behaviour. An individual may have an attribute that influences his or her observable behaviour; for example, mental abilities, such as verbal or non–verbal reasoning, may influence how information is interpreted and acted upon. People differ in their mental abilities, emotional wellbeing and personality traits, all of which can systematically affect the way they perform or behave on the job [15]. Assessments can be conducted to measure such constructs that cannot be directly observed.

Assessments can be conducted at various stages of the employee life cycle, for example during the pre–employment process to identify and flag undesirable characteristics, deselect

individuals who may not meet the minimum competency requirements for the position and identify those individuals who best match the requirements for the job. Assessments of existing job incumbents can also be conducted periodically to monitor and assess/evaluate the individual's physical and psychological fitness for work. A well–defined job profile will detail the competencies required for successful job and task performance. The identification and selection of appropriate assessments need to focus on matching competency requirements to job performance requirements as defined by the job analysis.

There are a wide range of assessment tools that can be used at various stages of the employee life–cycle to make decisions about the following [15, 16]:

- *Recruitment and Selection*: Assessments can be used to determine whether a prospective employee is the right person for the role, whether there is a good fit between the person and the work environment and to determine whether an individual has the necessary technical and behavioural competencies to cope with the demands of the job and meet required performance standards. Use of the correct behavioural assessment tools will show for example if an applicant for the post of security guard is likely to remain vigilant and complete full perimeter security checks despite adverse weather conditions and whether the applicant for control room operator will remain calm and composed during an emergency situation and be able to recall the relevant critical procedure and demonstrate the appropriate response;
- *Promotion or Progression*: Assessments can be used to determine whether or not an employee has the potential for a management or leadership role, which employees have higher capabilities enabling them to progress to a role with greater complexity and increased responsibilities, and to identify current strengths and areas for development. Assessment tools, for example a work sample test, behavioural interview and ability test will help establish for example, whether the high performing maintenance team leader has the competencies to fulfil the requirements of a strategic leadership role and is ready to advance his or her career within the short–term, medium term or long term;
- *Career Development*: Assessments can facilitate career decision–making by providing insight into vocational interests, work values, ability and aptitude and help individuals determine roles or a career path that would best match their strengths, potential and aspirations. Individuals may sometimes make a career choice because of the remuneration and benefits attached to the role or the level of authority associated with the role, rather than the role to which they are most suited;
- *Training and Development*: High cost training programmes such as reactor operator licensing can yield little or no return on the investment if the trainee decides to discontinue or fails to meet attainment levels. Assessments such as technical aptitude tests and personality inventories can facilitate identifying individuals who best match role requirements, can cope with the demands of an intensive training programme and who have the potential to succeed. Assessments can be used to determine whether or not an individual has mastered a particular component of the training programme and help identify those trainees who may benefit from advanced training;
- *Competence Assurance*: Assessments can be used to establish whether or not an employee continues to be mentally, physically and emotionally fit to perform safety–critical tasks after experiencing a traumatic event or following a prolonged absence from work due to incapacity. Simulations, observations and other work sample tests can determine whether or not the individual is still able to perform tasks that are infrequent and may only be performed in abnormal conditions or emergency situations.

2.4.2 Choosing a fit–for–purpose assessment approach

The choice of assessments will depend on the intended use or purpose, what the assessment is designed to measure or predict, the level of standardisation, objectivity and technical specifications such as test reliability and validity. These assessments vary in terms of a few key dimensions namely [15]:

- The intended use or purpose for which they were developed, e.g. recruitment and selection, promotion and progression, training or career counselling;
- The design basis of the assessment: what the assessment is designed to measure, e.g. abilities, aptitude, preferred work styles, values, vocational interests or personality traits; and what the assessment may be designed to predict, for example job performance and potential to develop and progress;
- The method of assessment, for example online assessments, computer-based simulations or scenario-based work sample assessments;
- The level of standardization and objectivity, e.g. subjective evaluations of applicant's résumé, highly structured and quantifiable ability tests, semi–structured interviews, structured work samples with clear right or wrong answers and norm–referenced personality inventories with no specific right or wrong answers.

A description of various assessment methods that can be used at various stages of the employee life cycle are described below.

2.4.2.1 Structured interview

The competency–based job profile provides the basis for a structured interview that focuses on relevant assessment criteria. Very specific, open–ended questions regarding past performance are structured to explore a particular competency that is relevant to performance requirements (e.g. the ability to influence stakeholders to take particular actions to improve plant safety). Behavioural criteria or indicators are used to evaluate the candidate's response. A rating is assigned depending on the extent to which the candidate's answer matches negative and positive behavioural indicators. For example, these types of questions may be asked to assess an individual's relationship–building capabilities:

- How do you ensure that you maintain good working relationships with your senior colleagues?
- Give us an example of a situation where you had to deal with a conflict with a peer in the same work team?
- Tell us about a situation where you experienced escalating conflict due to differences about a decision or action that needed to be taken. What did you do to resolve the situation? What was the outcome?

2.4.2.2 Psychological assessment

Psychological testing is designed to assess an individual's mental characteristics for example intelligence, personality, or clinical condition. Not all psychological tests produce a numerical value, and some are open to interpretation. A psychological assessment involves more than just a psychological test and may include interview information, medical evaluation, observational data, personal history and clinical interview. A psychologist determines what information to use based on the purpose of the assessment, the specific issue or questions being asked. The clinical interview is a common assessment technique whereby the psychologist is able to observe how the individual thinks, reasons and explores how the individual interacts with others. Assessments may also include interviewing other people who

interact closely with the individual such as co-workers or family members (these interviews, however, would only be performed with written consent from the individual). Comprehensive psychological assessments may need to be considered for high–risk, safety critical roles such as Operators, Shift Managers and Emergency Response Managers where uncertain emotional stability and mental health status could have an adverse impact on performance.

2.4.2.3 Psychometric tests

Psychometric tests can be regarded as a sub–set of psychological testing. They involve the measurement of a range of individual characteristics, such as: ability, personality, preferences, behaviour, and performance. They are defined as a "standardised sample of behaviour which can be described by a numerical scale or category system" [16]. Psychometric tests are conducted under controlled conditions whereby the testing procedure, administration, scoring and interpretation of results are all conducted in accordance with established test standards. The objective is to produce measurable data with numeric values which can be interpreted and analysed using comparative data from comparative norm groups. Such standardisation and the use of numerical scales enable a more precise and objective interpretation of results. Psychometric tests are divided into two main groups: ability and personality. Ability tests measure existing capabilities for example numerical reasoning, verbal reasoning, critical thinking and there are clear right or wrong answers. Personality tests provide insight into how an individual typically behaves and what their behavioural preferences are. Additional tests may also measure aptitude and attainment.

(a) Ability tests

These tests typically measure general and specific mental abilities**.** There are a range of ability tests (e.g. verbal reasoning, deductive reasoning, critical thinking) that can be used to determine whether individuals have the required cognitive capabilities to meet the performance requirements of the role. The choice of the test will be based on the role requirements, the assessment criteria and the validity of available tests for the occupational group:

- *General ability tests* measure one or more broad mental abilities, such as verbal reasoning, non–verbal or mathematical reasoning skills;
- *Specific ability tests* include measures of distinct mental and physical abilities for example mechanical ability, written comprehension, and mathematical reasoning. Physical ability tests assess abilities such as strength, endurance and flexibility.

(b) Personality tests

Personality tests assess whether there is a match between the individual's behavioural preferences and the personal qualities/attributes needed to be effective in the role. The results can allow the assessor to interpret if an individual is fit for the role. Personality tests are purely descriptive - there are no right or wrong answers and therefore these tests are typically referred to as questionnaires or inventories. A test can be used as part of the selection process for job interviews, to assess potential to develop or progress or to determine training requirements. The most commonly used type of personality test is the self–report inventories tests. There are many personality tests, each proposing different constructs and methods of assessment.

Trait–based personality tests are built upon a set of five stable and measurable elements, called traits, which are referred to as the 'Big Five' factors or dimensions of personality. Each of the five dimensions consists of a number of distinct facets or characteristics of personality

[17]. Empirical research supports the relationship between these personality factors and job performance, and its applicability across a broad spectrum of semi–skilled, skilled and professional occupations and a variety of cultures [18]. The traits are:

- *Extraversion*: Describes emotional energy and interaction with others, and ranges from being gregarious, expressive and outspoken to being introverted, contained and indirect;
- *Agreeableness*: Describes the degree to which an individual is cooperative and good-natured, and ranges from sceptical, firm-minded and uncooperative to being trusting, supportive and empathetic;
- *Conscientiousness*: Describes the degree to which an individual is persistent, motivated and goal-driven, and ranges from being highly disciplined and organized to being spontaneous and disorganized;
- *Neuroticism*: Involves the degree to which an individual is emotionally stable and resistant to stress, ranging from being well–adjusted, calm, self–confident and poised, to being sensitive and anxious;
- *Openness to experience*: Describes the degree to which an individual is open to new concepts and ideas, ranging from being conventional and pragmatic to being imaginative and curious.

Personality tests such as the Identity Personality Questionnaire, the 16 Personality Factor Inventory (16Pf), the Occupational Personality Questionnaire (OPQ), the Neo–Personality Inventory (NEO–PI) and the Hogan Personality Inventory all measure the five universal underlying personality traits that make up an individual's overall personality [19].

(c) Aptitude tests

These tests aim to predict and measure future potential and are often used in graduate or apprenticeship recruitment. These tests often measure broader, underlying aptitudes in contrast to an ability test which often measures the capacity to do a specific task.

(d) Attainment tests

These tests are designed to assess knowledge and skills gained through formal learning, education or instruction and seek to measure how much an individual has learnt for example in school and university examinations. Some tests, for example a mechanical comprehension test may include measures of ability, aptitude and attainment.

In summary, psychometric tests are one form of assessment that can be used in selection, development and as part of a continuous competence assurance process. Using psychometric tests alongside other forms of assessment increases the value that the psychometric tests can add and improves the overall validity of the assessment results.

2.4.2.4 Competency–based assessments

Competency-based assessments focus on behaviour rather than the underlying personality traits, providing a mix of standardised assessment tools that assesses an individual's performance against a predetermined standard that is directly linked to job performance in a specific work context. This is different from traditional norm–referenced psychometric assessments which compares the performance of the individual against the performance of a selected group. This approach emphasises systematic, direct observation of behaviour and draws largely from assessment centre technology. The underlying principle of competency–based assessments is that past behaviour predicts future performance, thus it aims to measure or assess skills and abilities specifically relating to the particular job for which the assessment is being conducted [20]:

— Competency assessments require the collation and integration of outcomes–based evidence about an individual's ability to perform the job. It involves the collection of sufficient evidence of performance to demonstrate that the individual can perform to specified standards. Competency assessments typically include an assessment of skills, knowledge and attributes needed for the role.

A battery of competency–based assessments to assess technical and behavioural competencies will typically include work sample tests, direct observation, simulation exercises and structured practical demonstrations (followed by questioning).

2.4.2.5 Work sample tests

These tests provide a sample of the actual work or simulate real aspects of the job closely and are useful in assessing whether someone has the required skills to perform key activities or tasks successfully. Individuals perform observable, job–related tasks that provide the opportunity to demonstrate required behaviours. Examples (described below) include in–basket exercises, clerical tests, typing tests, and simulations (e.g. carrying out an emergency procedure in a control room simulation). These tests can range from simple clerical checking tests to more complex work sample tests such as the ability to perform a procedure in a simulated control room or use judgement and effective decision–making in strategic or operational management. Usually multiple competencies can be assessed, for example, formulating a work sample test that requires the use of a procedure can be used to assess attention to detail, ability to interpret and follow written instructions, rule compliance and vigilance. These are especially useful for roles where a high level of procedural adherence is required. Applicants for a Project Manager role may be asked to plan for the installation of new equipment. This type of exercise could give insight into ability to analyse data, offer multiple solutions, plan the project, and finally to present findings using presentation skills.

(a) In basket exercises

These exercises contain e-mails, documents, memorandums of typical problems and issues to be resolved that are related to the job. For example, a clerical in–basket exercise would contain information and tasks that the individual would have to prioritize and decide on an appropriate course of action.

(b) Event simulation

These tests present the candidate with information about an event or incident, describing the situation when the event occurred, the responses of those involved and some of the actions that may have been taken. Individuals are posed a series of questions and they are asked to write down how they would respond, detailing the decisions they would make and the actions they would take. The test is scored by subject matter experts.

(c) Clerical checking tests

These are used to select candidates for clerical and data input jobs, particularly where accuracy is important and where mistakes can have serious consequences, e.g. tasks associated with roles involved in compiling work instructions, job cards or other resources used in the setting to work process.

(d) Simulation exercises

Simulation exercises typically take the form of a structured role play (for example an emergency planning exercise) during which an actual workplace situation or event is simulated. This is particularly useful to assess competencies that may decay over time due to

infrequent use; to assess an interpersonal situation which frequently occurs in a job in which interpersonal skills and behaviours are critical, and to assess how individuals may react under real job pressures and stress. Simulations incorporate practical demonstration (e.g. delivering a presentation to a safety review board) followed by a set of questions related to task outcome/result and behaviour.

2.4.2.6 Behavioural observations

This involves the direct observation of an individual carrying out a particular task in a controlled or uncontrolled situation. On the job observations are a practice that has been encouraged in the nuclear industry, especially in nuclear power plants as a form of ongoing/continuous evaluation and assurance of competence. More importantly leaders are encouraged to use this as an opportunity to recognise and positively reinforce appropriate behaviours and standards at the point of work and to coach employees to correct adverse behaviours. This practice sometimes referred to as 'on–job coaching', is aimed at reducing human error and improving performance and provides an opportunity for observational behavioural assessments, for example:

- Ability to communicate with the operating staff in the control room using clear three–way communication;
- Ability to use appropriate human performance assessment tools (e.g. self–check, peer checks, independent verification);
- Compliance to rules and procedures in execution of the work;
- Ability to respond to questioning and challenge in an open, non–defensive way.

Behavioural observations either take place 'on the ground' during the execution of actual work tasks or during simulations for training and requalification and can be performed by a supervisor, peers and/or independent third parties. Assessment of knowledge can also be integrated into these observations by asking individuals questions to assess their understanding of safety procedures. In some companies, behavioural observations are guided using validated task descriptions, procedures, work instructions or guidelines. This improves the objectivity and validity of observational assessments. Practices to increase the validity of the behavioural observations during simulations include:

- Setting up a multi–functional assessment team that includes a behavioural expert (for example an occupational psychologist);
- Using trained observers;
- Using behavioural markers that specify 'what good looks like'.

Behavioural observations can be integrated into daily work activities, providing opportunities for ongoing/continuous assessments that form an integral part of a competence assurance process.

2.4.2.7 Situational judgement test

Situational judgement test (SJT) is a bespoke assessment that can assess judgement applied to a specific situation that relates to the role. This test simulates a real work scenario which requires decisions that need to be made or issues that need to be resolved. Individuals are given a few scenarios or situations and a number of actions that could be applied. The individual is asked to evaluate and rank order or rate the most effective action. Responses are marked against a model answer that has been informed by the performance requirements of a rigorous job analysis. The value of situational judgement tests is that they:

- Are based on actual challenges or scenarios linked to the role;
- Assess constructs linked to job performance and therefore have high predictive validity;
- Consist of realistic, work–based scenarios and can be given to job applicants which will therefore assess their suitability and job–person fit;
- Avoid unfair discrimination based on group differences, e.g. nationality, culture, race, gender;
- Are cost–effective for high volume assessment and time efficient thereby making them suitable for incorporating into an assessment centre;
- Are difficult to fake.

SJTs can also measure aspects related to behavioural style. These tests are increasingly being designed to work across culture by focussing on universal criteria. Research to pinpoint what underlying constructs these tests are actually measuring is ongoing. See Annex IV for a description of a process for developing an SJT.

2.4.2.8 Assessment Centres

The term assessment centre does not refer to a physical place, rather, it describes an approach. It is a multi–assessment methodology that allows individuals to demonstrate their competencies. Assessment centres typically involve a combination of psychometric tests, interviews, case–studies, individual exercises (e.g. board presentation) and group exercises (e.g. team problem–solving). Individuals are observed by a team of trained assessors who evaluate each individual against specified behavioural competencies with clear performance criteria or behavioural indicators.

An assessment/development centre can assess the readiness to progress, the level of management that the individual has the potential to progress, and also development gaps that can be addressed via a targeted growth and development strategy. Multiple assessments can identify an individual's strengths, development areas and potential in their current or future role. In a talent management context, an assessment centre is sometimes referred to as a development centre and typically includes psychometric tests and various behavioural exercises, e.g. case studies, role play and in–baskets. They are designed to simulate different aspects of the work environment and assess how closely the applicant's behaviours match the requirements of the role.

(a) Role play

Role plays simulate actual work-based interactions. Scenarios are described and the individual is required to assume a particular role (e.g. the individual being evaluated may be asked to assume the role of the Shift Supervisor who is tasked to have a meeting with the Plant Manager to challenge a recent decision that was made at the Plant Focus Meeting which may compromise safety). Observers may also be provided with certain leading questions which help elicit the behaviours to be observed.

(b) Case studies

Case studies tend to focus on complex problems that are usually set in particular job contexts. These typically provide information about a particular work-based situation and will be constructed around typical problems that may be encountered. The candidate is required to analyse the problem or situation and respond to specific questions, providing reasons to support their decisions and actions.

(c) Group exercises

These involve candidates working together as a team to resolve a given problem scenario. These exercises commonly assess interpersonal and leadership skills such as teamwork, group problem solving and decision–making and team leadership skills. Group exercises may range from 'leaderless group discussion' formats to problem solving and decision–making scenarios.

The British Psychological Society has produced standards for the design and delivery of assessment centres [21], which provides guidance on best practice in employing Assessment Centre methodology in work related contexts.

2.4.2.9 Occupational stress assessment

An occupational stress assessment typically uses a combination of structured questionnaire and detailed feedback interview to establish how the individual feels about their job, their symptoms of stress, how they feel and behave normally, how they interpret events around them, the sources of stress in their job and how they cope with the sources of stress they experience.

2.4.2.10 Medical Examination

A medical examination can determine whether the existing or prospective employee is physically capable of performing their tasks and without posing a risk to their safety, the safety of others or the facility.

The following questions can inform the development of local assessment practices and the choice of assessment tools (Section 5 will explore specific behavioural requirements relevant to the nuclear industry):

- What do we want to assess and why?
- What personality attributes are required for safe and effective performance in a highly regulated, proceduralized and safety conscious environment?
- What behavioural competencies are required to work safely and securely in critical situations or under high stress?
- What behavioural competencies are needed to work safely under routine conditions?
- How will the assessment results be used?
- What will the results of the assessment lead to (selection, certification and authorisation)?
- What assessment tools can be used to objectively assess performance–based evidence of behavioural competence?
    - What assessment methods/tools can be used to establish whether there is a suitable fit between the person and the role and organizational culture or work environment?
    - What assessment tools can be used to objectively measure or assess competence?
    - How can the personality attributes that will influence performance success be assessed?
    - How is it ensured that the there is an appropriate alignment between the method of assessment and the competencies being assessed (does it match risk level, complexity, difficulty)?
    - How can these assessment tools be validated to demonstrate the link between personality characteristics and safety performance?

— How can behavioural observations be used to assess behavioural competencies?

- What opportunities are there for behavioural observations?
- What behavioural competencies can be observed through on the job behavioural observations?
- Are there measurable criteria or behavioural markers to guide the assessment and evaluation of competence?
- How can measurable criteria or behavioural markers be used to guide the assessment and evaluation of competence?

— How is on–going competence assessed to provide assurance that the employee is fit for duty?

- What assessment frequency is required to ensure on–going competence for critical roles?
- What behavioural competencies need to be assessed to ensure that a deficiency will not lead to human error and contribute to an incident or event?
- What periodic or continuous evaluation is needed to establish whether employees in high–risk safety–critical roles are fit to work?
- What assessments can be used to establish whether the individual is still fit to continue performing safety–critical activities?

2.5 APPLYING A RIGOROUS AND ROBUST ASSESSMENT OF COMPETENCE AND CAPACITY USING AN INTEGRATED ASSESSMENT PROCESS

An integrated assessment process that combines and evaluates all the relevant data and information provides a more robust picture of an individual. Employment–related decisions need to be based on a rigorous and robust behavioural assessment process that integrates multiple assessment data. Over–reliance on one single assessment or over–emphasis on one single criteria can lead to a distorted or limited view. Using a variety of assessments will assist in reducing the number of errors and improve the overall effectiveness of employment–related decisions [15].

An assessment process can be defined as a systematic approach to integrating and evaluating all the assessment data and information and using it to make employment–related decisions at various stages of the employee life–cycle.

Figure 4 provides an overview of the key phases and activities that lead to the effective selection of assessment methods and tools.

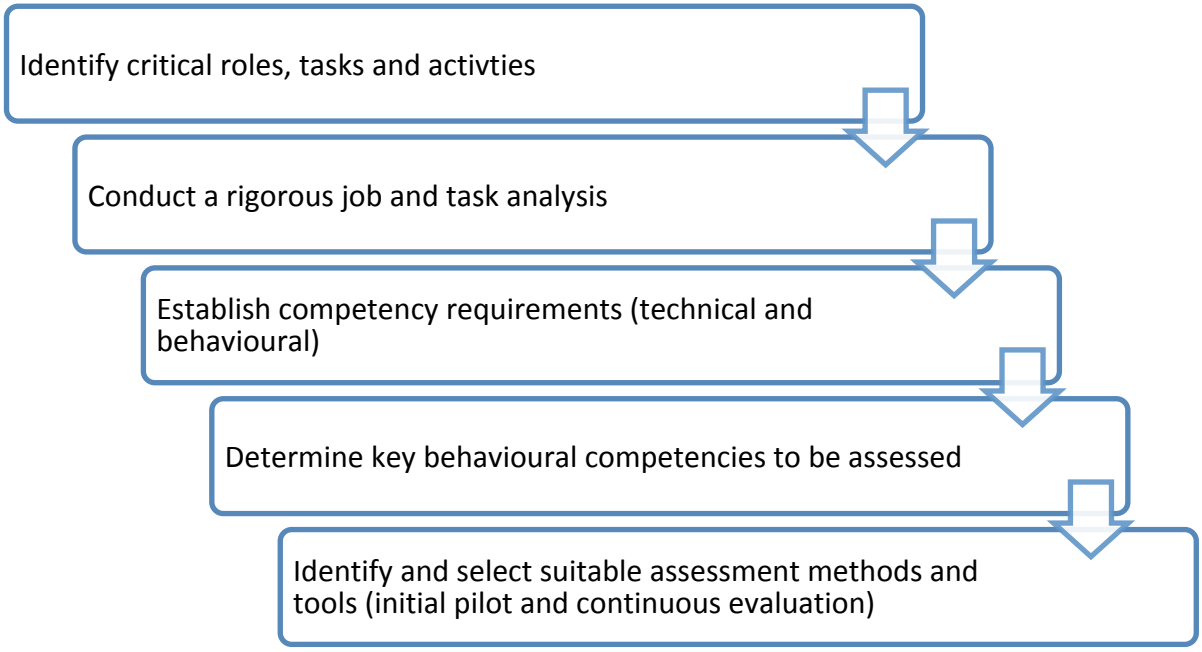

FIG. 4. High level overview of the key phases and activities for the effective selection of assessment methods and tools

The following principles need to guide the development of a fit–for–purpose behavioural assessment process:

— Integrate multiple assessment data that incorporates observations of real or simulated work tasks/activities. There is a number of assessments that can be used throughout the employee life–cycle. When assessments are combined, they generally increase the validity of the results. Objectively observing and systematically measuring how people actually perform the work tasks is one of the most effective ways of assessing individuals for selection or development. When on–the–job observations are not feasible, the next best approach is to use assessments which simulate the activities carried out in the target job or as similar to them as possible, for example, situational judgement tests and simulations;

— Use valid and reliable assessment methods and tools. These need to be tailored to the performance requirements of the job, and the competencies needed to carry out the essential tasks of the job [22]. Assessments need to be based on pre–defined, objective and defensible criteria. They need to use valid, reliable and objective assessment tools, that is, tests that will produce repeatable and consistent results and will enable an objective assessment and comparison of an individual against competencies that are important for job performance. The choice of assessment instruments needs to be justified and supported by an objective analysis procedure with written documentation of the reasons behind the choice;

— Ensure equity and fairness in the assessment process and methodology. Assessments or evaluations need to avoid any unfair discrimination and inappropriate exclusion of individuals from work that they could carry out safely and productively. Assessment practices need to apply equally to all personnel who occupy safety critical roles or those roles that have been identified as posing a risk through an objective and valid risk assessment process. The process of assessment needs to avoid any individual being

unfairly disadvantaged and needs to be free from unfair discriminatory factors such as race, gender, age, disability, social or ethnic background.

Annex V provides an overview of the potential advantages and disadvantages of various assessments. Critical considerations, key challenges and detailed guiding principles to inform assessment practices and tools are discussed further in Section 3 of this publication.

2.6 COMPETENCY REQUIREMENTS FOR LINE MANAGERS, EMPLOYEES AND TEST USERS

All personnel who are involved in the design, implementation and use of assessments need to have the necessary competence to fulfil their roles and responsibilities. Key competency requirements for line managers, test users (e.g. HR staff, Occupational Psychologists) and employees are described in Table 2.

TABLE 2. KEY COMPETENCY REQUIREMENTS FOR LINE MANAGERS, EMPLOYEES AND TEST USERS

Key competency requirements	Line managers	Employees	Test users
• Knowledge and/or understanding			
Understand the relevant policies, procedures and roles and responsibilities of staff involved in the process	✓	✓	✓
Understanding of employer and/or employee rights and obligations and the consequences of non–compliance	✓	✓	✓
Understand the health and safety hazards associated with abuse of drugs and alcohol	✓	✓	
Understand the potential adverse effects on job performance of mental stress, and fatigue	✓	✓	
Knowledge of the individual's responsibility to report any safety and performance concerns related to self– and peers	✓	✓	
Knowledge of the resources and services available to the employee and how to access these	✓	✓	
Understanding of assessment principles and procedures	✓		✓
Understanding of the technical requirements of psychometric tests			✓
Knowledge of specific assessment instruments, their underlying constructs			✓
Knowledge of current professional, legal and ethical requirements for conducting tests and their practical implications for test use			✓
Knowledge of professional ethics, codes of conduct and good practice related to test use and administration			✓

TABLE 2. KEY COMPETENCY REQUIREMENTS FOR LINE MANAGERS, EMPLOYEES AND TEST USERS

Key competency requirements	Line managers	Employees	Test users
Knowledge of the context in which the test is being used, and any situations that may affect the interpretation and use of test results			✓
• Skills			
Ability to identify behavioural symptoms or indicators that may lead to negative performance consequences	✓	✓	
Ability to detect behaviours in self and others that may indicate impairment due to drugs, alcohol or medication	✓	✓	
Ability to detect behaviours that may indicate possible mental or physical impairment that potentially pose a risk to safety and security	✓	✓	
Ability to conduct behavioural observations using relevant and appropriate indicators to guide judgements	✓	✓	✓
Ability to integrate testing with other assessment information (e.g. biographical data, interview, and references etc.);			✓
Ability to interpret test scores based on a thorough understanding of the psychological constructs underlying test scores			✓

2.7 CONTINUOUS MONITORING AND EVALUATION OF ASSESSMENT EFFECTIVENESS

Periodic monitoring and evaluation of both the assessment results and impact needs to be in place to evaluate the effectiveness of the programme, process and practices and to identify opportunities for continual improvement. Changes to local legal requirements and job requirements may necessitate changes or updates to ensure compliance with established principles, guidelines and regulations. Areas for improvement and ways to optimise the process and practices need to also be identified. Ideally quarterly reviews would be conducted to identify performance shortfalls and take any corrective action that will bring about improvements.

The evaluation needs to include:

— An evaluation of the effectiveness of the assessment process and programme against the targeted or stated objectives;
— Inputs from all key stakeholders on the value of the behavioural assessment process and experiences in completing, delivering and/or administering assessments;
— Measures to assess whether the quality of employment–related decisions have improved;
— A review of the applicability of the existing assessment tools within the context of any business changes and/or legislative changes;

— An analysis of the strengths, weaknesses, risks/threats and improvement opportunities related to current assessment practices.

Section 9.2 of the IAEA's Technical Reports Series No 380, Nuclear Power Plant Personal Training and its Evaluation: A Guidebook [23], provides detailed information on the components important for effective evaluation.

3 CRITICAL CONSIDERATIONS AND KEY CHALLENGES

3.1 STAKEHOLDER ENGAGEMENT AND COLLABORATION

Early engagement and collaborative working with all stakeholders in the development and implementation of a behavioural assessment process is critical to its effectiveness. Consultation and collaborative development will facilitate intellectual and emotional buy–in and commitment which is essential to successful implementation. Visible support and investment from the executive and senior management of the organization is needed to ensure that the programme has the necessary resources (people and financial) and receives the appropriate focus and attention, both strategically and operationally.

Through a consultative and collaborative process with key stakeholders, a policy and supporting procedure which clearly outlines the programme purpose, objectives and scope can be established. This would take into consideration:

- Factors that could adversely affect the worker's ability to competently and safely perform their duties;
- Assessment process and practices;
- Roles and responsibilities in the implementation of the programme;
- Management obligations;
- Employee expectations and rights;
- Openness, transparency and accessibility of the assessment and procedure are important and need to be easily available to all personnel.

The purpose of the assessments needs to be clearly stated and communicated to all participating members, assessors and administrators. Clarity and transparency around the purpose and nature of the programme, the objectives of the assessment and ways in which the data will be used are important.

It is important that all internal and external stakeholders (individuals and groups) are provided with relevant and applicable information about the assessments. It is preferable that this information is provided in a language that is clear to all stakeholders.

3.2 COUNTRY–SPECIFIC LEGISLATION, REGULATIONS AND STANDARDS

Each country will have legal, professional and ethical regulations governing the employment process, many of which have important implications for conducting assessments. The general purpose of employment legislation and regulations is to prohibit unfair discrimination and provide equal employment opportunity for all. Discrimination occurs when employment decisions are based on factors that are not relevant to the performance requirements of the job.

Countries differ in the degree of statutory control over test usage, test accessibility and rights to purchase and use test materials. Some have a high degree of regulation and legislation to control testing standards while in others such standards may be lacking or non–existent. For example, testing material may have specific restrictions in various countries - in some access may be restricted to registered psychologists, while in others access may be provided to accredited behavioural practitioners or approved national test distributers only. Country–specific legislative requirements need to guide the assessment process, procedures and practices – the choice of assessment tools, how they will be administered, interpreted and

used. Differences in national employment legislation and individual privacy preclude a uniform approach to assessment.

The assessments need to be legal in the country in which they are applied, and all practices need to be in compliance with relevant legal and regulatory guidelines. Legislative requirements need to be identified and applied to determine the feasibility of proposed assessment practices. Examples of relevant legislation include: Employment Rights legislation, Health and Safety Regulation, Employment Equity Legislation and Data and Privacy Protection. It is unlawful to use a test or selection procedure that creates an adverse impact unless there are specific performance requirements.. These cases must be documented and guided by an approved employment policy).

The lack of uniformity and consistency in test methodologies, together with the increase to access to assessments on the internet has led to the development of guidelines by the International Test Commission [24], which provides national psychological associations and other relevant professional bodies to compare local practices. These guidelines can be used as a basis to develop locally applicable standards. Further the increase in online assessments also raises a number of challenges related to standardised administration of the testing process [24].

3.3 CULTURAL FAIRNESS AND DIVERSITY

An accelerating increase in international mobility of workers has also increased the need for testing on multilingual and multicultural applicants. Careful consideration needs to be given to the different cultural context in which assessments will take place. National, social and cultural differences will influence the validity of the psychometric test and the type of assessment techniques which work well and under given assessment conditions. For example, individual exercises which require independent problem–solving and decision–making may work well in more individualist cultures but may fail to bring out the desired behaviours in more collectivist cultures which may encourage collaborative teamwork. A rigorous job analysis needs to determine what ‘good looks like’ in that particular context in order to optimise the person-role alignment.

This is equally relevant to the choice of questions in competency–based interviews. Understanding national and cultural differences and determining the fairness, validity and applicability of assessment tools is essential. Using assessments that are biased against certain groups may result in unfair discrimination against members of the lower scoring groups and may prevent employers from making equitable employment decisions. Assessment methods aimed at establishing whether there is a suitable organization fit may also consider generational differences as this has an impact on expectations, values, motives and aspirations.

When psychometric tests are used universally for diverse groups of candidates or individuals (with different experience, education or culture), test users are required to make reasonable effort to ensure that tests that are being used ae not biased and will not discriminate against diversity [24], through:

- Avoiding constructs being assessed that have different relevance and meaning to different individuals;
- Obtaining evidence on possible group differences in test performance and relevant norms for test scoring and interpretation;
- Seeking documented evidence to support the validity of the test in the various groups;

— Minimizing potential effects of group differences that are not relevant to the main purpose (e.g. language differences).

3.4 ESTABLISHING RELIABILITY AND VALIDITY OF ASSESSMENTS

Assessments designed to evaluate competence, potential or performance need to be valid and reliable, and produce repeatable and consistent results for any employee to ensure that no–one is inappropriately excluded from work that they could carry out safely and productively.

Reliability refers to how consistently and accurately a test measures a characteristic. A test is considered to be reliable if an individual takes the test again and gets the same or similar score. Reliable assessment tools produce information about people that is dependable, repeatable and consistent [15].

Validity refers to the construct the test is intended to measure and how well it does so. It also describes the degree to which specific conclusions or predictions can be made about people based on their test scores. A high level of validity indicates that there is a linkage or correlation between test performance and job performance. It is best to use tests which have demonstrated validity with respect to relevant populations and relevance for the purpose for which they may be used. A test cannot be valid in an absolute sense, it can only be valid in a particular context and for a specific group of people [25]. In other words, the test's validity has to be established in relation to the intended use or specific purpose and in reference to specific groups. For example, an assessment designed to predict the performance of managers in situations requiring critical thinking and problem solving may not be valid for administrative or clerical staff. It is important to note that while a test can be reliable without being valid, the test needs to have achieved an adequate level of reliability as necessary prerequisite for validity.

Validity can be assessed in various ways depending on the nature and purpose of the assessment. It can include the following elements:

— *Content validity*: Focuses on demonstrating that the content of the assessment adequately represents the performance requirements of the job. A detailed job analysis and the formulation of a competency–based job profile are essential to content validity;
— *Construct validity*: Refers to the extent to which inferences can be made about the construct (skills, knowledge or attributes) based on test performance;
— *Predictive validity*: Refers to the extent to which the performance or outcome on an assessment can predict an individual's future performance;
— *Criterion–related validity*: Determines whether there is a significant statistical relationship between assessment scores and job performance or training performance. If a significant relationship is established, candidates with more favourable scores will be expected to demonstrate better performance on the job.

While validity will indicate how good is a test for a particular situation, reliability will show how trustworthy is a score on that test [15]. All tests need to have technical manuals which provide information on the technical specifications of the test's reliability (how stable or consistent a measure is the test) and the strength of its validity (how well it actually measures what it claims to measure). Test manuals need to describe the reference groups used to develop the test, the groups for whom the test is valid, and the interpretation of scores for individuals belonging to each of these groups. Reference or norm groups enable comparison of a person's performance on a particular test with that of other people. Using appropriate norm groups is important to ensure that a test effectively discriminates between satisfactory

and unsatisfactory results. It would be unfair to compare the performance of a university graduate on a particular test with that of a group of experienced engineers, whereas comparing a school leaver's performance with that of a group of other school leavers would be a fair comparison.

Consideration also needs to be given to the unintended consequences of testing, both positive and negative. For example, a test may be designed to assess critical thinking; however, test results may be influenced by English comprehension and may yield different test scores for different groups based on literacy rather than the actual cognitive ability being assessed. Tests should be supported by evidence of validity and reliability for their intended use. Formal establishment of the job–relatedness or validity of any tests that are used for selection or periodic assessments is important for legal defensibility [24]. The technical specifications need to be reviewed before a decision is made on whether or not to use a particular test.

To ensure that a strong foundation for validity is established, the following needs to be done:

- Ensure there has been a thorough analysis of the job for which assessment is being used;
- Verify that the competencies (knowledge, skills, abilities, aptitudes and personality traits/characteristics) which the tests are intending to measure, correlates with relevant behaviours in the work context;
- Provide justification for the use of tests which clearly demonstrate the correlation between constructs being assessed and job performance;
- Integrate assessment results with other relevant collateral sources of information.

Key questions to ask when evaluating the validity and reliability of psychological tests [26]:

- What is the construct the test is supposed to be measuring?
- How aligned are the test items with the description of the construct?
- Is there a match between what the test is designed to measure and what the test intends to measure?
- What evidence is there that this test is reliable?
- Does the test have an acceptable level of reliability?
- What evidence is there that this test is valid in this particular situation for this particular group?
- What procedures and criteria were used to validate the test?
- What is the degree of similarity between the individual or group being tested and the norm group that the test was standardised on?
- Will the test provide accurate results in the context in which it is being used?
- Does the test relate to important aspects of the job?
- Can the test be validly used in the way in which it is intended to be used?
- Is the test fair to test takers of different racial, gender, age and cultural groups?
- Can the evidence of validity be generalised to different situations?
- If the candidate is required to read the test, does the individual's reading ability match the level required by the test?
- Are there alternative explanations for getting a particular score on this test (e.g. literacy level)?
- What are the potential unintended consequences of using this test?

Annex VI is a detailed questionnaire to guide the selection of valid and reliable psychometric tests.

3.5 CONSCIOUS AND UNCONSCIOUS BIAS

Bias in assessment refers to the presence of factors which result in the unfair discrimination between test takers due to systematic differences in the meaning of test scores associated with group membership. Unfair discrimination occurs when individuals with equal probabilities of success in the job have unequal probabilities of being hired for the job [27]. Tests which are biased are not fair to one or more groups of tests–takers [15, 28]. Bias can either be conscious or unconscious.

"Unconscious bias refers to a bias that we are unaware of, and which happens outside of our control. It is a bias that happens automatically and is triggered by our brain making quick judgments and assessments of people and situations, influenced by our background, cultural environment and personal experiences" [29].

Unconscious preferences or biases about others can influence the way in which individuals engage with and form opinions about other people. Assessments and the consequent decisions may be influenced by less visible dimensions such as religion, education and social background, with a number of negative and positive characteristics being automatically assigned to anyone being associated with that particular group. These are automatic and unconscious biases and can influence anyone.

Some strategies to limit unconscious or conscious bias include the following:

- Remove irrelevant information from the collateral and assessment information (such as name, age, ethnic origin);
- Ensure that assessment criteria are carefully constructed and defined with clear behavioural indicators;
- Instruct assessors to assign their own individual ratings and then aggregate their collective scores;
- Train assessors in unconscious bias so that they can become more self–aware;
- Build in gender and cultural diversity into the interview/selection panel;
- Include an objective review of assessments for potential bias factors such as over–emphasis of a characteristic found less frequently in one gender, ethnic or cultural group.

3.6 LANGUAGE INFLUENCES

The language of the test, the test taker and test administrator are all critical considerations. When tests are administered in multi–lingual contexts (within or across countries), it is important to ensure that [15, 24]:

- Each language or dialect version has been developed using a rigorous methodology meeting the requirements of best practice;
- Test content excludes the use of terms, expressions or events that are common to some cultures but not in others;
- Test administrators are able to communicate clearly in the language in which the test is to be administered;
- The individual being tested has the required level of proficiency in the language in which the test will be administered;

— The appropriate language version is administered, or bilingual assessment is performed, if appropriate.

Wherever possible tests are to be administered in the language of the test-takers, even where the test content is designed to provide evidence of knowledge or skills in a non–primary language.

3.7 DOCUMENTATION CONTROL, PRIVACY AND CONFIDENTIALITY

Data privacy applies to any information relating to an individual and includes information provided on application forms, or captured in short–lists, interview records and assessments. These personal data may be subject to data privacy controls. Specific measures need to be put in place to prevent unlawful processing, accidental damage or loss of personal data.

Assessment results, like all other personal information need to be stored with due regard to confidentiality. Access needs to be restricted to those with a need to know and in accordance with what has been agreed with the respondent during administration and feedback. Measures need to be established to control access to assessment data, personal records and information. Consideration needs to be given as to how data will be collected, who will have access to the data and write reports, how reports will be used, with whom reports will be shared, how long the reports will be stored and for what purposes they will be used.

It is also necessary to specify who will have access to the results, the levels of confidentiality and how assessment results will be used. Finally, the relevant consents need to be obtained before releasing results to anyone else.

Ideally, the policy and procedures would address the following:

— What should be classified?
— How it should be classified, handled and stored?
— Who should have access to the data?
— When should access be revoked?
— What are the requirements for paper and electronic data (cyber)?
— What are the sanctions for non–compliance?
— What are the quality assurance measures and is there continuous training on proper handing?

Organizational and technical measures are needed to safeguard data privacy [30]. Organizational measures include:

— Establishing data protection and security policies;
— Monitoring compliance with policies and procedures;
— Raising staff awareness about their rights and responsibilities under the relevant data protection act;
— Putting in place relevant mechanisms to control and monitor data access.

Technical measures include:

— Physical security surrounding the areas where personal data are held;
— Lockable filing cabinets for personal data;
— Encryption, firewalls and password protection for computer filing systems;
— Guarding against loss by regular daily backups.

3.8 ADDRESSING EMPLOYEE CONCERNS

Employees may have fears and concerns about assessments, how the data will be used and the impact that this will have on their employability. The following assessment practices will help to manage these:

- Clearly define the objective of the assessments;
- Explain levels of confidentiality to individuals;
- Define the assessment criteria and share it with the individual in a transparent manner;
- Provide feedback to the individual on their performance in a constructive non–threatening approach;
- Be transparent about the nature of records created and data collected.

3.9 SUMMARY OF KEY PRINCIPLES

The following principles guide the development and implementation of a behavioural assessment process and practices. They take into account the critical considerations outlined previously:

- Openness and transparent engagement with all stakeholders (organizations, trade unions, managers and employees) involved in or affected by the process;
- Collaborative development of a behavioural assessment policy and procedure which outlines the purpose, principles, parameters, roles, responsibilities and accountabilities;
- Ensure assessment practices comply with professional and legislative requirements (e.g. Codes of Practice; Equity Legislation, Data Protection Act, Privacy Laws);
- Use only tests that have proven reliability and validity for the specific intended purpose and are appropriate for the target population;
- Assessment procedure to outline ways to ensure that psychological tests that are used at any stage in the employee life–cycle have been empirically tested, valid and reliable, can be applied fairly, are not biased against any gender, national, cultural or racial group and will not result in unfair discrimination based on group differences;
- Assessments viewed as a process that incorporates multiple assessment data to determine whether or not the applicant or employee has the behavioural competencies to achieve performance requirements for safe, secure and effective performance;
- Multiple assessments combined into an assessment battery, with each assessment focussed on specific behavioural competencies and when combined provide an integrated summary of the strength of existing behavioural competencies and the potential to develop those competencies required for successful job performance;
- Avoiding overreliance on one assessment tool to make employment–related decisions, instead using instead a holistic approach;
- Assessment methods and tools need to be an integral component of the assessment battery and provide a broader systemic perspective of behaviour;
- Assessments need to facilitate differentiation between existing capabilities and/or potential to develop required competencies to enable an organization to identify high performers and/or talent;
- Assessment methods and tools to facilitate gathering evidence about past behaviour to enable a prediction of future performance.

4 GENERAL RECOMMENDATIONS DURING THE EMPLOYEE LIFECYCLE

This section provides information on the assessment process, practices and tools that can be used at each stage of the employee's life–cycle to improve the quality of selection, promotion and development of decisions. The stages of the employee's life cycle are shown in Fig. 5.

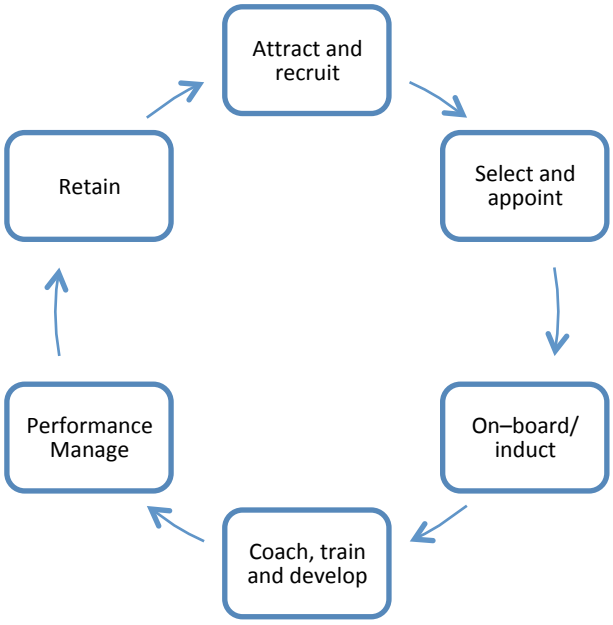

FIG. 5. Stages of the employee's life cycle

The nuclear industry faces a number of challenges and requirements with respect to talent, namely:

- Expanding and newly established nuclear programmes are hampered by an ageing workforce who are expected to reach retirement age in the short and medium term;
- It takes more than 10 years to design, license and construct a nuclear power plant, 60–80 years to run it, and finally another 10 years to decommission it. Qualified nuclear professionals who can ensure high safety standards and form part of a stable long–term workforce is therefore crucial;
- There are a number of countries introducing nuclear power and expanding new build programmes. There is a demand therefore for a new cadre of nuclear professionals who are educated and trained for successful entry into the nuclear field, resulting in an increased demand for talent and an increased need to recruit skills globally;
- Structural shifts in the demand for human resources with more pronounced demands in emerging and developing countries;
- Increase in the diversity of the talent stream due to global mobility.

The need to use assessment methods that provide a more accurate and objective view of competence, potential and performance is even more pressing as overreliance on more subjective assessment methods may lead to ineffective hiring decisions, poor job and work environment fit, performance failures, low levels of engagement and high turnover. Generally, the nuclear industry has well–developed processes to identify technical or cognitive skills and abilities – the 'can do' aspects; however, there is a gap in assessment practices to identify the 'will do' aspects of performance [31].

4.1 RECRUITMENT AND SELECTION

Selection assessment practices need to establish whether there is a suitable fit between the person and the role requirements and the organizational culture/work environment.

Safety standards for the recruitment, qualification and training of personnel for nuclear power plants [9] specify the importance of establishing clear selection criteria to differentiate between individuals and provide an objective basis to accept or reject applicants and reduce the influence of subjective factors. Selection criteria need to include education, relevant experience, work background, aptitude and personal attributes (for example, emotional stability, motivation, innovation) and safety–cultural related attributes (for example questioning attitude, communication, rigorous and prudent approach). Recommended assessment methods include: interviews, objective testing to measure aptitude and applying the requirements for medical and psychological fitness for duty relevant to the position [9].

Assessment tools used in the selection process to identify applicants who meet security, safety and performance requirements need to reveal information to enable the organization to answer the following questions:

- Does the employee have the capabilities to meet the essential performance requirements of the job?
- Does he/she have the competence and capacity to work safely under routine conditions?
- Does he/she have the competence (skills, knowledge, behaviour and attitude) to work safely in critical situations or in highly stressful conditions?
- Does the employee have the attributes and values to work in a highly regulated, proceduralized and safety conscious environment?
- Is there a suitable fit between the person and the role requirements?
- Is there a likely suitable fit between the person and the organizational culture?

Country–specific legislation will determine whether psychological tests or other assessments may be used in the pre–employment stage. Typically, the following assessment and evaluation methods are used to screen information provided by the candidate in their CV's (or during the interview) and to collect complementary information on the applicants' competence and past performance and select those applicants who may not meet *essential* security, job and organizational requirements:

- *In–depth analysis of application file*: Detailed review of the application cover letter, curriculum vitae, employment history to assess whether the applicant's educational qualifications and work experience match the basic requirements of the job;
- *Education verification:* Validate attendance and completion of courses at educational institutions and the award of professional qualifications and verify the equivalence of those qualifications if obtained in a different country;
- *Work history verification:* Verification of work experience, employment history and ascertain whether there were any disciplinary issues or termination due to incapacity;
- *Criminal checks:* Checks are conducted with law enforcement agencies to determine any prior arrests, criminal safety charges or convictions;
- *Financial checks:* Credit history and financial data is obtained to assess an individual's financial status;
- *Background checks:* Involves gathering information about the applicant's behaviour in a non–work environment to get a sense of the person's character, credibility, personality attributes and lifestyle (includes social media);

— *Drug test:* Identify the presence or use of drugs;
— *Security vetting:* To determine any potential security issues or concerns that pose a risk to the security at high security nuclear facilities. Individuals will be eligible to obtain a security clearance following a successful initial evaluation and screening.

Assessment methods/tools recommended for final selection and placement of external candidates include:

— *Structured interview:* This is generally used in the selection of all candidates for recruitment, promotion or succession planning. It provides an opportunity for a two–way exchange of information and enables the applicant to ask questions that will enable them to assess whether this is the right role or organization for them;
— *Work sample tests:* Are useful to evaluate whether an applicant's competencies can be successfully applied to a specific context and to evaluate an organization/work environment fit. A situational judgment test can also help a candidate to assess their fit with the role and associated work tasks;
— *Psychometric tests:* Aptitude tests (for example, numerical reasoning, technical understanding, fault diagnosis, mechanical comprehension) are useful for the selection of apprentices, while personality inventories give insight into personality attributes that may be important to safety culture. Clinical personality tests like the MMPI (Minnesota Multiphasic Personality Inventory) are used to identify psychopathology and are not specifically designed to measure job–related personality dimensions. These tests may have limited use in occupational contexts where insight into an individual's mental state and emotional well–being may be relevant to high–risk or safety–critical roles. In some countries, personality inventories that can lead to the identification of a mental disorder may be considered a medical exam and may only be permitted in limited circumstances [15];
— *Feedback on past performance*: Past performance is a useful predictor of future–performance. Competency–based reference checks can elicit feedback from previous work colleagues that can be compiled with more objective assessment data.

Figure 6 shows a flowchart depicting the recruitment and selection process and the various stages in which assessments can be used.

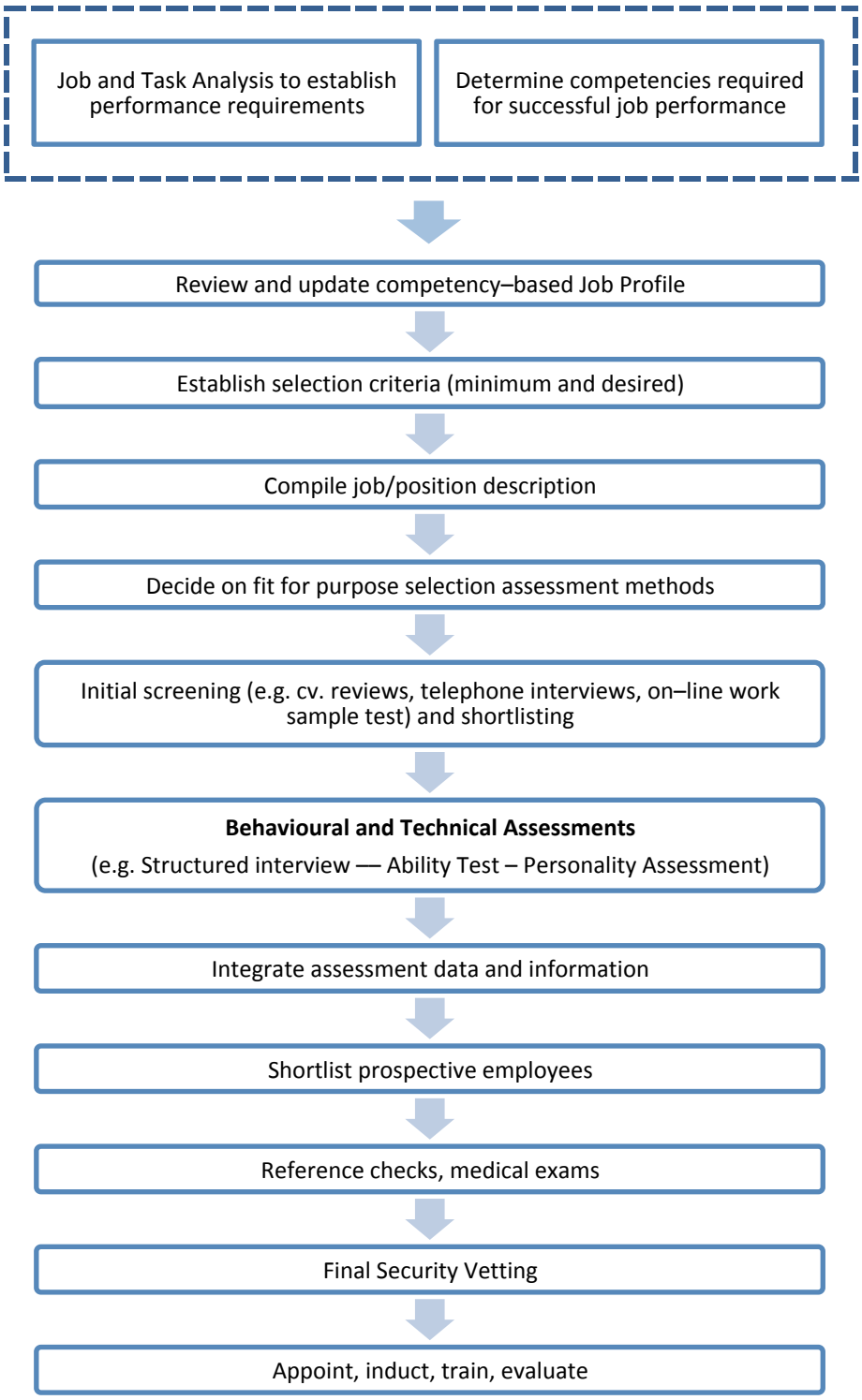

FIG. 6. Recruitment and selection process/ flow–chart.

Detailed below in Table 3 is an example of an assessment strategy for a reactor operator.

TABLE 3. SELECTION ASSESSMENT STRATEGY FOR REACTOR OPERATOR EXAMPLE

Assessment Centre						
Selection Criteria	Interview	Situational Judgement Test	Simulation Exercise	Ability Test	Personality Questionnaire	Reference Check
• Cognitive Ability						
Analytical thinking		✓	✓	✓		
Problem–solving		✓	✓	✓		
• Interpersonal skills						
Verbal communication	✓		✓		✓	
Assertive communication	✓		✓		✓	
Collaborative teamwork	✓		✓		✓	✓
• Personality Attributes						
Attention to detail					✓	
Emotional stability					✓	
Resilience	✓		✓		✓	
Adaptability	✓		✓		✓	
Stress tolerance			✓		✓	✓

A rigorous and robust assessment process integrates multiple, objective assessment data to make sound, defensible selection decisions. Each selection criteria needs to be assessed using three assessment methods in order to make an objective judgement about competence or potential. A fit–for–purpose assessment strategy based on valid selection criteria provides a sound basis for selection decisions.

Key factors in developing a fit for purpose selection assessment strategy include the following:

— Completing a comprehensive job analysis to identify the key behavioural competencies required for safe, secure and effective performance within the specified roles;
— Designing an assessment process by selecting or developing reliable, valid and fit for purpose assessment tools to assess/measure the behavioural competencies;
— Piloting the assessment tools with the target group of employees;
— Validating the assessment tools by demonstrating the link between the assessments
— Refining the assessment process based on the outputs from the validation;

— Continually monitoring and reviewing the assessment process.

4.2 TRAINING AND DEVELOPMENT

In many organizations, an individual development plan (IDP) forms part of the performance management and development process. The IDP documents a personal/career growth and development strategy to improve performance and achieve short, medium- and longer-term career goals and aspirations. Assessments can facilitate career decision–making by helping individuals to pinpoint their career interests, potential and aptitude and generate a plan that is relevant and addresses training and development needs that result in improved individual and organizational performance and increased individual job satisfaction.

The following principles underpin a career and performance development process targeted at achieving both employee and organizational needs:

— The employee has primary responsibility for drafting the IDP. While the IPD is jointly owned, it is employee driven;
— The manager has primary responsibility for conducting the IDP discussion, providing meaningful input and signing off on the development plan;
— There is no set formula for developing an IDP. The process needs to be flexible, providing options to meet the needs of all individuals. No attempt should be made to adopt a ‘one size fits all’ approach;
— The IDP focuses on training and development that falls within the scope of the organization’s career pathways;
— The IDP is an ‘enabling tool’ that facilitates both individual career development and organizational succession planning.

4.2.1 Career assessment tools

Career assessments tools are designed to facilitate career decision–making and development by providing insight into an individual’s strengths, behavioural preferences, motivations, aptitudes and skills which can impact potential performance, job satisfaction and engagement. Career assessments can help individuals to identify suitable career options, preferred work environments, competency gaps and development strategies that will prepare them for a career change or career progression.

Figure 7 shows the three-step process incorporating various assessments to facilitate career thinking and decision making.

FIG. 7. Three step process incorporating various assessments to facilitate career thinking and decision making

Examples of career assessment tools include:

- *Career assessment interview:* A career assessment interview with a trained career counsellor or occupational psychologist can help integrate assessment information in the broader context of the individual's aspirations, personality, goals and the organizational culture. In–depth interviews provide insight into career goals and aspirations to determine whether individual goals match organizational needs. These interviews also provide an opportunity to assess behavioural competencies through competency–based questions;
- *Occupational Personality Questionnaire OPQ 32:* Developed by Saville and Holdsworth Limited (SHL). Assesses preferred work behaviours and personality and identifies potential strengths and weaknesses, and areas for further development [32];
- *Identity Questionnaire – Careers Feedback Report:* Developed by Quest Partnership. It can help an individual gain an insight into behavioural preferences, learning style, and possible vocations which may be best suited to their interests [33].

Selecting candidates for high cost intensive training and development programmes but who then fail to achieve success can be costly, for example one candidate failure in a licensed reactor operator training programme can cost a nuclear power plant more than $400,000 [31]. Research conducted to assess whether the NEO–PI–3 (a five factor measure of personality) could improve the selection of candidates for licensed reactor operator training, found significant correlations between several personality factors in both the written and simulated operating exams [31]. In particular, conscientiousness had predictive validity for operator exam scores. Results of the studies supported the use of using the NEO–PI–3 to improve operator selection.

4.2.2 Talent assessment tools

Trainability tests are a useful assessment method to determine whether individuals have the ability to learn a particular task and the potential to learn the skills required to achieve performance standards. During this assessment individuals are shown how to perform a critical task and are then given the chance to learn the task. This test gives an insight into their natural aptitude, and their existing level of skill and potential to learn and achieve required performance standards.

An important part of an organization's talent management strategy is the design and implementation of an assessment process to evaluate performance, potential and readiness to progress. This is key to enabling organizations to identify future leaders, successors and/or high potential employees. Robust assessment data can be used to put together development plans to close the gap between where individuals are and where individuals need to be. A proactive talent management process can produce a talent pipeline that can meet the organization's short, medium and longer–term capability needs.

The following questions can guide the choice of assessment tools:

- What are the best practice assessment tools/methods to assess readiness and potential to progress?
- What assessments practices can be used to help us develop a leadership pipeline with the right skills, competencies and breadth of experience?
- What assessment practices can be used to identify and develop a talent pipeline for critical technical roles (e.g. operators)?

There are various assessment tools that can be used to identify and evaluate talent for leadership and critical technical roles (e.g. operators). An assessment or development centre provides a robust assessment of potential. When combined with other assessment data such the career interview, performance reviews/appraisals, on–job observations and 360-degree leadership evaluations, they provide a more holistic picture of an individual.

Examples of assessment tools that are used for talent assessment include:

- *Situational judgement test*: For example, the SHL Management Scenarios Test can help individuals identify their readiness for a more senior or management role identify current strengths and area in need of development [34];
- *Performance reviews/appraisals*: An effective performance review/appraisal will evaluate results and the behaviour demonstrated in achieving performance results. Performance data will ideally include feedback from internal and external stakeholders that the employee interacts with on a daily or frequent basis; observations of behaviour in real situations; and objective performance indicators that reflect results achieved. Accessing records of past performance reviews/appraisals can provide good insight into past behaviour;
- *Assessment centres*: To identify high potential talent for leadership roles, simulation exercises can include chairing a corrective action review board, facilitating a team meeting, conducting a performance review, delivering a strategy presentation to the board etc. Table 4 below shows an example of an assessment centre for Maintenance Team Leaders. Each competency is assessed with least three different methods.

TABLE 4. ASSESSMENT CENTRE FOR MAINTENANCE TEAM LEADER ROLE EXAMPLE

Competency	Group Exercise (lead team meeting)	Individual Exercise (role play)	Personality Tests	Group Exercise (problem–solving)	SJT: Management Scenarios
Problem–solving and decision–making	✓		✓	✓	✓
Assertiveness	✓		✓	✓	
Communication and influence	✓	✓	✓	✓	
Builds and maintains relationships	✓	✓		✓	
Motivating Others	✓	✓		✓	
Collaborative teamwork	✓		✓	✓	
Stress Tolerance	✓		✓	✓	
Adaptability	✓		✓	✓	
Resilience	✓	✓	✓		

Section 7 provides further detail on recommended assessment practices for developing leaders individually and collectively.

The flowchart in Figure 8 shows a generic talent management process to contextualise succession planning and the use of assessments in this process.

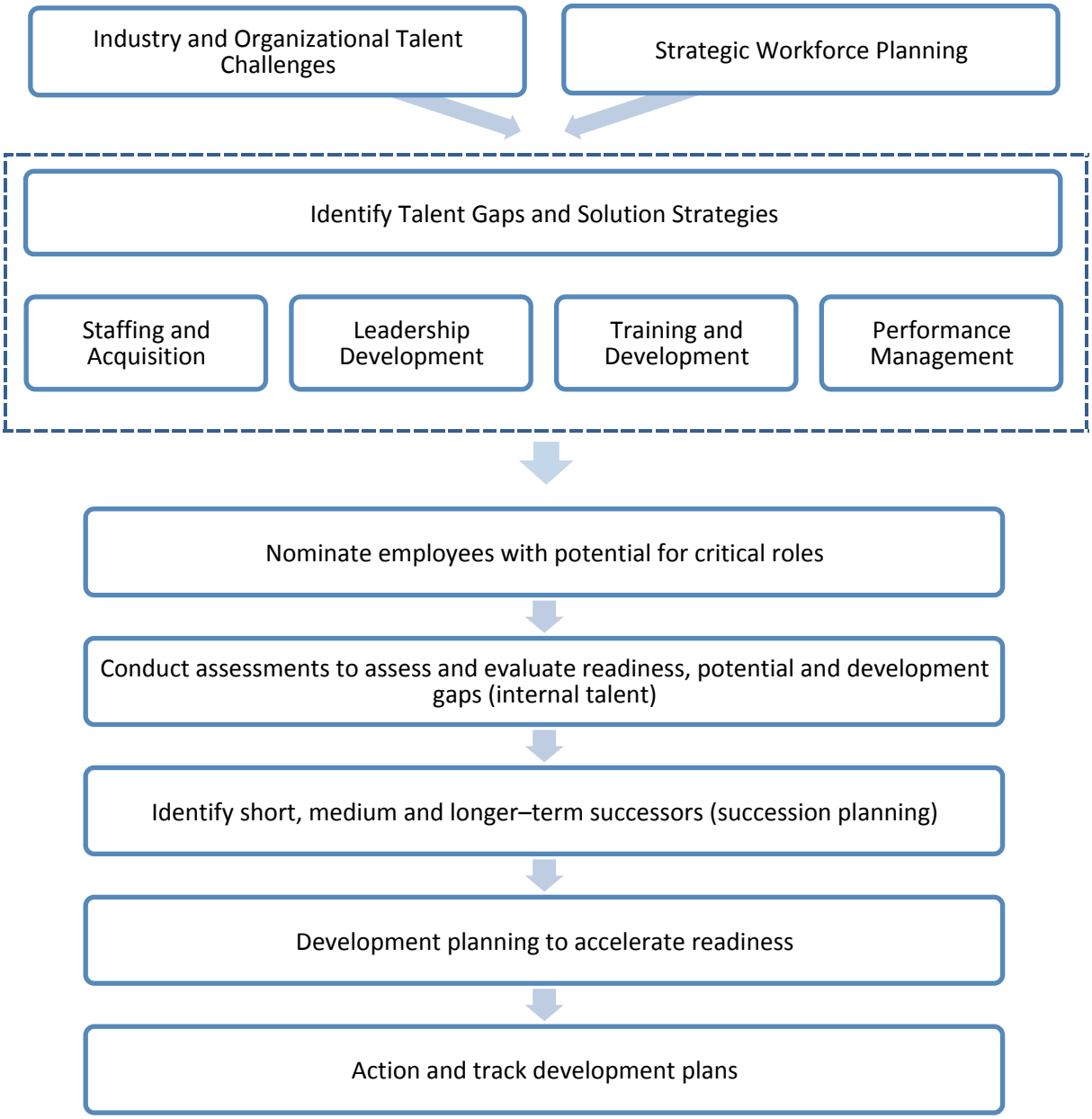

FIG. 8. Talent assessment for progression

4.3 PERFORMANCE MANAGEMENT

Performance assessments form part of a performance management process aimed at managing an individual or team's performance to ensure the delivery of the required performance results and bring about a continuous improvement in individual, team and organizational performance.

The following principles underpin a robust performance management system:

— Performance management is not just a system of forms and procedures to direct and control performance. It is about the actions that people take to achieve the day–to–day delivery of results and the process a manager applies to direct and guide daily performance;

- To be effective, organizations need to have a well–established culture of accountability where individuals take ownership for their individual performance and shared responsibility for the collective performance of the team and the organization;
- Individuals and teams need to have clarity and alignment about acceptable performance levels, targets and standards;
- The focus is not only on performance areas and measures, but also on development processes to ensure individuals develop to improve their knowledge, skills and level of expertise;
- Ultimately, performance management is about ensuring that individuals and teams use their strengths and abilities to achieve expected performance results that contribute to the overall goals and results of the team and the organization.

Performance assessment uses objective data to assess and measure actual performance against objective performance standards and incorporates feedback that positively reinforces good performance and facilitates the identification of areas for improvement and development.

The criteria for an effective performance assessment [35] include:

- Clear performance expectations and standards that are defined and translated into measurable performance goals and indicators (measures and targets), which are documented in a performance agreement;
- Performance indicators or criteria that explain how the performance standard will be measured or assessed;
- Clear, direct link between performance measures and job competencies that need to be visible and explicit, and ideally documented in a competency-based job profile;
- A performance agreement, which provides the basis for the performance review, appraisal or assessment, while the job profile is used to provide supporting information;
- Feedback on performance which is continuous and focuses on both the results that were achieved and the behaviour in achieving the required results;
- Performance assessment that is robust and considers both human factors and organizational factors which impact human behaviour and performance success;
- A well-defined, competency-based job profile together with the performance agreement which provides a more holistic basis for the assessment;
- Performance shortfalls that are identified, and any competency gaps contributing to performance shortfalls that are also identified; this includes both technical and behavioural competencies;
- Development plans that are structured to address performance and competency gaps;
- Optimal performance that is recognized and competencies contributing to performance successes identified and positively reinforced;
- Formal performance reviews/appraisals that need to be conducted periodically at least every six months.

Examples of performance assessments include:

- *360-degree performance feedback*: A 360-degree performance appraisal solicits feedback from a number of stakeholders that the employee interacts with when performing their job, for example, peers, direct reports, senior colleagues and customers. Individuals also complete a self–assessment of their own performance (results and behaviour). The multi–rate feedback provides a wide–ranging perspective of performance and enables a more objective process. High quality 360-degree

performance appraisals provide feedback on both results and behaviour. Behaviours are rated as observed by the direct manager, peers, customers and team members. These ratings are combined and integrated to provide an average rating for each of the respondent categories and then rolled up into an overall score per behaviour;

— *On the job observations*: Observations of actual behaviour in the real work environment or a simulated work setting (e.g. control room simulator) can provide valid performance–based evidence of competence, grounded in objective task analysis and guided by clear performance standards. Behavioural criteria or markers can be used to guide the assessment of behavioural competencies, e.g. critical thinking, communication, adaptability, etc.

4.4 COMPETENCE ASSURANCE

Periodic assessment of competence is recommended to provide assurance that personnel remain competent to perform any safety related work. Assessments need to provide opportunities for staff to demonstrate appropriate knowledge, skills and behaviour that will ensure safety under a variety of conditions relating to their roles and responsibilities [9]. The requirements for ongoing/continuing evaluation of competence need to be based on the safety–criticality of the task and an evaluation of how competencies may decay over time.

The key questions to consider in the development and implementation of a continuing evaluation process include the following:

— What behavioural competencies need to be assessed to ensure that a deficiency will not lead to human error and contribute to an incident or event?
— How likely is it that skills and knowledge may decay due to lack of practical experience?
— What type of assessments could provide assurance of ongoing competence for safety–critical tasks?
— What periodic or continuous evaluation is needed to establish whether employees in high–risk or safety–critical roles are mentally and emotionally fit to work?
— What assessments can be used to establish whether the individual is still competent to continue performing safety–critical activities?
— What assessment frequency is required to ensure continued competence?

4.4.1 Assessments to ensure ongoing competence

Assessments of individual competence as a basis for authorisation to perform work on safety–critical systems may include, but not be limited to, knowledge of the safety rules and regulations, technical capabilities, measures of job performance and attitudes and skills required for effective performance in a safety culture (for example, stress tolerance, self–control, questioning attitude) [9].

Periodic/continuing assessments would be narrower in scope with the objective to provide assurance that individual is still competent to perform a safety–critical task during abnormal conditions or emergency situations. Psychological assessments aimed at identifying whether an employee is still mentally, physically and emotionally capable of performing his or her tasks, may be included for roles that have a high-risk implications for the safe and reliable operation of the facility, e.g. operators in a nuclear power plant. Psychological tests will aim to identify symptoms of a psychological problem although this may not be the origin of all

problems. There may be other personal factors involved such as problems at home, trauma, illness, etc.

Examples of assessments typically used in periodic evaluations are listed below as well as the purpose of each:

- Medical examinations to identify any changes to physical and physiological health and any emerging medical conditions that may pose risks to nuclear safety or security;
- Occupational fitness assessment to provide assurance that the employee remains physically capable of safely performing their tasks;
- Behavioural observations to detect behaviours which may indicate possible use of drugs or alcohol, fatigue, physical or mental impairment that may adversely affect the ability of individuals to safely and competently perform their duties. Simulation exercises (e.g. operating control room simulations) may also form part of certified workers' requalification to assess whether or not they are competent to perform required tasks in emergency situations;
- Psychological assessments to determine whether the individual is psychologically capable of performing the assigned tasks and will not pose a threat or risk to their own safety and the safety and security of the organization and/or the facility;
- Drug and alcohol testing to identify if there are any indications of the use of drugs or alcohol while on duty (or within a specified time period prior to duty) or assess if the individual may be under the influence of any substance which may cause physical or mental impairment.

4.4.2 Specific assessment practices and recommended frequency for critical roles

More frequent assessments may be required for higher risk safety roles or tasks/activities where skills may decay due to infrequent usage. Most organizations require an annual assessment of performance. An effective performance appraisal would incorporate structured peer feedback, on–the job observations and an assessment against measurable performance criteria. The basis for an effective review/appraisal is a robust performance contract which specifies goals and targets to be achieved in that particular performance cycle. In the case of routine, operational roles, a well–defined job profile with clear performance standards can be used as the basis.

People involved in complex safety critical tasks, such as control room operators, may need to undergo a more rigorous assessment of competence which is linked to a formal requalification or recertification of competence every one to three years. The highest risk tasks may be assessed every six months. Specific critical roles will require periodic or continuous evaluation to establish whether employees are fit for duty or fit to work. Staff occupying these safety–critical roles may be required to complete various assessments linked to job performance requirements to establish whether they are still competent and mentally fit to continue performing safety–critical activities. For example, operators may be required to complete a requalification that consists of simulation exercises to establish their technical and behavioural competence as well as psychological assessments to assess whether they are still emotionally and mentally fit to respond in an emergency situation.

4.4.2.1 Annual drug and alcohol testing

All workers holding critical positions need to complete annual alcohol and drug testing. Drug and alcohol abuse may not only cause physical and mental impairment but can also impact the safety and security of the facility/organization and all who work there. Employees with drug

or alcohol problems may also be more susceptible to the negative influence of external pressures such that their actions might compromise the safety and security of the organization. Procedures and practices need to be in place to ensure that random drug and alcohol testing is administered in a way that provides reasonable assurance that individuals are unable to predict when the testing may take place [36].

4.4.2.2 Annual medical examinations

All staff performing critical roles and performing work that is subject to radiation exposure, need to complete an annual medical examination. Medical fitness for duty is also required if an authorised person moves to a different position in the same or new nuclear power plant [9]. The primary goal of the medical examination is to identify physical limitations which may cause particular problems with performing a specific task or may prevent the reliable performance of critical duties.

4.4.2.3 Annual psychological evaluation

The psychological assessment/evaluation needs to include personality and cognitive tests as well as a structured interview to elicit behavioural information that will further qualify the assessment results. All relevant assessment data is integrated to determine whether a safety, security or performance concern exists and if the individual is capable of performing his or her assigned duties.

4.4.2.4 Annual security review

To determine any potential security issues or concerns that pose a risk to high security nuclear facilities.

4.5 AD-HOC ASSESSMENTS AND EVALUATIONS

Ad-hoc assessments are recommended for employees in security and safety–sensitive positions if there are reasonable grounds (e.g. through observed behaviour or after receiving credible information) to question an employee's physical, mental and emotional capacity to perform his or her duties.

All individuals experience changes in behaviour: this may be due to situational factors, role requirements, organizational cultural changes, work relationships, stress, pressure or emotional well–being. Significant, prolonged changes in behaviour that continue to intensify may warrant an assessment in order to determine possible causes, potential impact on safety, security and/or work performance and to identify appropriate remedial action.

Aberrant behaviour (behaviour that is different from a person's normal behaviour), may be a symptom of changes or problems in health, family or work relationships. Behavioural red flags that may trigger the need for ad hoc assessments include:

- Marked change in work behaviours or job performance, e.g. quality of work, concentration and attentiveness, observed patterns of poor judgement; high rate of human errors; acting impulsively without thought of consequences; repeated insubordination;
- Changes in social/interpersonal behaviour, e.g. interaction with colleagues, observed or reported patterns of interpersonal conflict;
- Changes in personal health, observable in physical habits, emotional state, mental capacity; excessive use of sick leave;

— Signs of intoxication on duty, e.g. speech patterns, breath odour;
— Dangerous, destructive or threatening behaviour;
— Fatigue, mental stress and memory loss.

Changes in behaviour can be due to a number of factors for example, personal loss or trauma (e.g. death, divorce), health, home and family issues. Behavioural changes may also be due to possible drug and/or alcohol abuse. Behavioural symptoms that may suggest the latter include:

— Slurred/impaired speech;
— Blood shot eyes;
— Memory loss;
— Drowsiness;
— Mood swings;
— Risk–taking behaviours;
— Poor coordination;
— Aggression;
— Irritability;
— Delayed responses;
— Disorientation;
— Hyperactivity.

Impaired behaviour could potentially threaten the safety and security of a nuclear facility. Early identification and expedient reporting may prevent a serious accident or injury and provide the timely and needed intervention for possible treatment. The duty to report aberrant behaviour is not limited to supervisors, all employees need to be encouraged to report any behaviours that may impair an individual's ability to perform their work tasks safety and competently to the relevant manager. Managers, supervisors and employees need to be trained on early identification of significant, or unusual behaviour, possible causes and ways to distinguish such behaviour from normal, insignificant behaviour [36].

Before initiating full assessments, collateral information should be obtained and reviewed, for example:

— Personnel records;
— Medical records;
— Performance records;
— Manager's feedback;
— HR data (e.g. sick leave records).

4.5.1 The impact of stress on workplace behaviour or performance

Stress and pressure may also impact physical, mental and emotional well–being. It is important however to distinguish between stress and pressure. Most people will experience pressure in a work environment; it can motivate individuals to perform at their best and can be the starting point for high performance. When perceived pressure or demands are greater than an individual's coping resources, they will feel unable to manage which can resulting in the manifestations of stress. Organizational or role changes can result in feelings of uncertainty, unfamiliarity, unpredictability and a sense of lack of control, which if it appears suddenly, is prolonged or feels too complex, can cause stress. Stress can negatively affect behaviour,

emotions and health. It can also be detrimental for the organization, an individual's performance, group functioning and stability of organizational culture. Individuals may experience stress due to a poor 'person–environment fit' or 'person–role fit'. For example, the role may require a high attention to detail, strict adherence to procedures and an ability to cope with high levels of stress.

The individual occupying the role may however enjoy being creative, value having the freedom to use their initiative and may find it challenging to work under high pressure. Selecting the person with the right behavioural attributes is therefore key in achieving a good role–person and person–environment fit.

There are four broad categories of stress:

- *Survival stress*: Where survival or health is threatened;
- *Internally generated stress:* Worrying about things out of one's control;
- *Workplace stress:* Result of the interaction between a person and their work environment – not being able to cope with demands;
- *Fatigue and overwork:* Stress that builds up over a period of time.

The symptoms of chronic stress shown in Table 5 are based on the research report on Competence Assessment for the Hazardous Industries produced by the Health and Safety Executive [37].

TABLE 5. SYMPTOMS OF CHRONIC STRESS

Physical Symptoms	Behavioural Symptoms	Cognitive Symptoms	Emotional Symptoms
• Shortness of breath • Muscle tension • Headaches • Heartburn • Palpitations • Chest pain • Skin rashes • Breathing difficulties • Indigestion • Sleeping difficulties	• Eating patterns alter • Substance abuse • Grinding teeth • Nail biting • Neglecting appearance • Procrastination • Negative attitude • Relationship problems	• Poor concentration • Memory lapse • Negative attitude • Forgetfulness • Confusion • Worrying	• Nervousness • Anxiety • Irritability • Crying easily • Impatience • Sensitivity • Feeling of doom • Over–reacting • Fidgeting

Stressors by themselves do not cause ill–health, however stressors can lead to a physical vulnerability exposing one to potential ill–health. Chronic stress may exacerbate pre–existing conditions, such as cardiovascular problems, digestive problems and diabetes

Individuals who experience feelings of stress, anxiety, depression may [37]:

- Have diminished ability to control their thoughts and actions;
- Be distracted by other thoughts and find it harder to focus on a task;
- Be less motivated to perform their work tasks safely;
- Be unable to recall a procedure or work instruction;
- Find it difficult to select the appropriate response in an emergency situation.

The Health and Safety Executive [10] identified six areas of work that can lead to stress if not proactively managed by the organization:

- *Demands:* Workload, work patterns and the work environment;
- *Control:* Degree of control or autonomy a person has in the way they do their work;
- *Support:* How supported and encouraged individuals feel by the organization, line management and colleagues;
- *Role change:* How organizational changes – large or small, are managed and communicated;
- *Relationships:* Nature and quality of working relationships – how conflict and unacceptable behaviour is addressed.

Organizations are required to assess the risk of stress–related ill health brought about by work conditions and take preventative and corrective action to control that risk. Preventative action can include stress surveys, well–being assessments and capability building interventions such as assertiveness training, conflict management, time management and emotional intelligence management.

Annex VIII is a self–assessment that organizations can use to assess existing assessment practices and tools to identify strengths of the current approach and potential areas for improvement.

5 ROLE SPECIFIC REQUIREMENTS FOR NUCLEAR SAFETY AND SECURITY RELATED ROLES/FUNCTIONS

A strong, sustainable safety culture depends on a number of organizational and human factors. The individual and collective actions of all the personnel who occupy both safety–critical and non–safety critical roles will have an impact on overall organizational performance. Selecting the right people who have the right personality attributes to perform in a safety–critical and highly regulated nuclear facility is key element of safe, secure and effective performance.

Safety critical roles and their risk factors may include [36]:

- Operations personnel: reactor operators, shift managers;
- First responders: fire fighters, ability to divert material during emergency events;
- Preventive maintenance personnel: ability to create unsafe conditions or sabotage safety systems;
- Health physics: radiation safety staff, ability to falsify assay values;
- Safety inspectors: ability to report situations that create unsafe conditions or sabotage safety systems;
- Security personnel: control of sensitive material access or information;
- IT personnel: access to personnel access authorization records, schedule of events, etc.;
- Nuclear material control and accountability personnel: access to inventory and location records;
- Transportation staff of radioactive materials: access to shipping schedules and records;
- Personnel with unescorted access to a reactor operations control room: private access for acts of sabotage;
- Personnel with unescorted access to nuclear material: ability to divert material;
- Personnel that issue site access badges: ability to create false credentials;
- Personnel responsible for nuclear safety: ability to create procedures that allow for diversion if compromised or for unsafe conditions when impaired.

The Traits of a Healthy Nuclear Safety Culture describes the essential traits and attributes of a healthy and continually evolving nuclear safety culture. In this context a trait is defined as

"a pattern of thinking, feeling, and behaving such that safety is emphasized over competing priorities. Experience has shown that these personal and organizational traits are present in a positive safety culture and that shortfalls in these traits and attributes contribute significantly to plant events" [38].

The essential traits and attributes of a healthy nuclear safety culture, which continues to evolve, are grouped into three categories: Individual Commitment to Safety, Management Commitment to Safety and Management Systems. These traits when embedded will be reflected in the values, assumptions, behaviours, beliefs and norms of an organization and its members. Essentially these traits highlight those behaviours that are most critical to creating and maintaining a healthy nuclear safety culture.

The IAEA has also prepared a Safety Report Series that provides guidance on performing safety culture self-assessments to enhance organizational learning and safety performance [39].

Behavioural indicators that demonstrate the internalisation and demonstration of these traits are proposed, as shown in Fig. 9. Annex VII provides a detailed behavioural profile of a Nuclear Professional in relation to the core safety culture traits. This profile has been developed as basis to reveal the core personality attributes that may contribute to the safe and effective performance of a nuclear professional within an organization seeking to establish and maintain a strong safety culture.

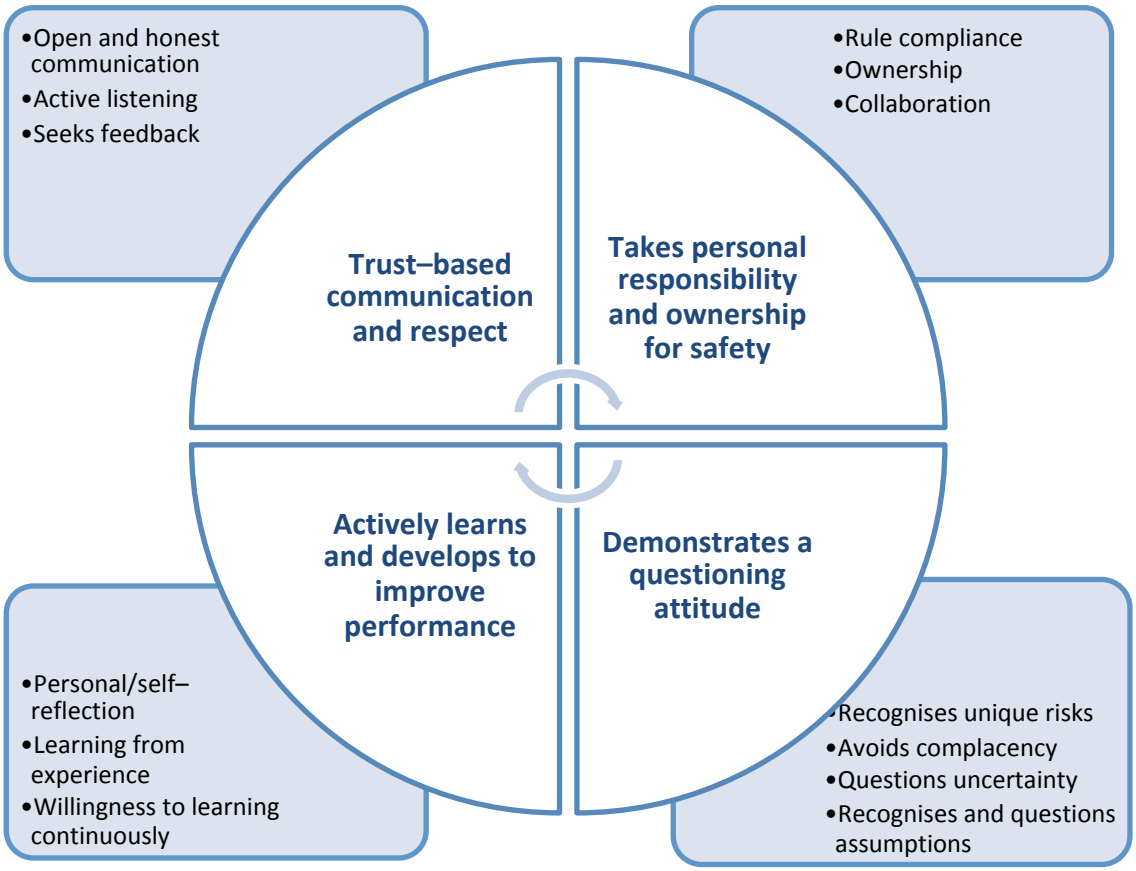

FIG. 9. Representation of the core attributes at the individual level

The proposed personality attributes that are core to safe and effective performance are presented in Table 6. The relative importance of these attributes is dependent on the performance requirements of the role.

TABLE 6. PERSONALITY ATTRIBUTES THAT ARE CORE TO SAFE AND EFFECTIVE PERFORMANCE

Safety Trait Characteristic	Safety Attributes	Personality Characteristics
Takes personal responsibility and ownership for safety	• Rule compliance • Ownership • Collaboration	• Conscientious • Self–discipline/control • Vigilant and attentive
Demonstrates a questioning attitude	• Recognises risks • Avoids complacency • Questions uncertainty	• Questioning • Assertive communication • Cautious and deliberate

TABLE 6. PERSONALITY ATTRIBUTES THAT ARE CORE TO SAFE AND EFFECTIVE PERFORMANCE

Safety Trait Characteristic	Safety Attributes	Personality Characteristics
	• Recognises and questions assumptions	
Trust–based communication and respect	• Open and honest communication • Active listening • Seeks feedback	• Open and honest/trustworthy • Communicates effectively with others • Cooperative/helpful
Actively learns and develops to improve performance	• Personal/self–reflection • Learning from experience • Training and development	• Open–mindedness • Willingness to learn • Learning agility

Valid, reliable and objective assessment tools need to be used to identify whether or not individuals have the personality attributes required for safe and effective performance. Consideration needs to be given to both initial assessments and on–going/periodic assessments. Country–specific legislation, national employment legislation, and other relevant contextual factors will influence the choice of assessment tools, specifically the selection of psychometric tests.

Recommended assessment methods are proposed for operations, engineering, maintenance, emergency responders, security personnel and contractors. Examples of key responsibilities are provided to illustrate the link between competency and performance requirements [40].

5.1 OPERATIONS STAFF

Licensed operations personnel have access to safety–critical systems and their actions and decisions can have a direct impact on the safe and effective performance of a nuclear power plant. Shift supervisors and managers, reactor operators authorise maintenance and operational activities and supervise technicians' work, such that their level of responsibility and degree of influence is high. A high level of competence assurance is recommended for initial qualification/authorisation/certification and on–going requalification and authorisation for license holders.

Examples of key responsibilities include [40]:

— Monitor all systems and equipment. For normal running conditions, identify any anomalies, and take or recommend appropriate action;
— Record operating data, note malfunctions of equipment, instruments, or controls and report these conditions as required;
— Respond to system or unit abnormalities, diagnosing the cause, and recommending or taking corrective action;
— Authorize corrective actions to address any operational issues;
— Develop or implement operational actions such as lockouts–tag-outs or clearances to allow equipment to be safely repaired;
— Authorize corrective and preventative maintenance activities on equipment;

— Supervise technical activities to ensure that all plant equipment is operated in compliance with relevant policies and procedures.

Operational roles that require ongoing monitoring of systems require a readiness to react and respond to emergency situations throughout long period of normal, routine shift duties. They are also required to monitor systems that have abstract signals. These tasks require specific cognitive capabilities and attributes that are unique from other nuclear professional roles. Rigorous assessments are needed to ensure that the right person is selected for this role.

Based on these key responsibilities, the behavioural competence requirements for licensed operators include those listed in Table 7 [40].

TABLE 7. SKILLS AND PERSONALITY ATTRIBUTES FOR LICENSED OPERATORS

Competency	Skills and Personality Attributes
Cognitive skills	• Analytical Thinking: ability to analyse operational data and information and using logical reasoning to interpret meaning • Critical Thinking: Ability to use logical, analytical reasoning to solve problems • Anticipate problems: ability to predict potential problems and likely outcomes of actions/decisions based on relevant operational data and information • Complex Problem Solving: Ability to review related information to develop and evaluate options and implement solutions for complex problems • Situational awareness: the ability to identify, process and understand critical elements of information about what is happening in the immediate surrounds
Leading and Managing skills	• Delegation: Ability to delegate task responsibilities appropriate to level of authority, utilising team capabilities effectively • Performance monitoring: ability to monitor and control the execution of tasks and ensure that required performance standards are achieved • Team Leadership: ability to work effectively with team/work group or those outside formal lines of authority to accomplish organizational goals, provide clear direction, influence action and commitment to decisions • Collaborative working: ability to actively share and transfer information across relevant functional work groups to facilitate coordination planning and execution of activities
Interpersonal skills	• Communication: ability to convey information correctly, clearly and concisely • Active Listening: ability to listen actively to what others are saying, paraphrasing and summarising to check for understanding • Assertive communication: ability to assert views and opinions about recommended corrective action, authorization decisions, etc. • Influence: ability to communicate convincingly
Personality Attributes	• Attention to Detail: thorough in completing work tasks • Stress Tolerance: maintain an effective ability to access knowledge quickly under stress and carry out a sequence of actions free from error in high stress situations • Emotional self–control: maintain composure, keep emotions in check, and control emotional expression even in very difficult situations • Resilience: persist in the face of obstacles, search for ways to overcome barriers • Adaptability: adapts response, actions, decisions to changes in the environment facts/data/information about operating conditions, risks, threats

5.1.1 Proposed assessment practices and methods

Proposed assessment practices and methods for operations staff are described in Table 8.

TABLE 8. PROPOSED ASSESSMENT PRACTICES AND METHODS FOR LICENSED OPERATORS

Assessment Method	Description
Medical examinations	Medical examinations can be conducted pre–placement and periodically at an interval to be determined by the job analysis. Ad hoc medical examinations can also be conducted when a medical concern that may affect the individual's fitness for duty is observed or identified.
Observational assessments	Use observational assessments to assess behaviours during normal or maintenance operational modes, e.g. ability to pay attention to detail, communicate clear instructions to technicians, respond to queries about operating instructions
Simulation Exercises	Use simulated exercises to gather performance–based evidence of the operator's ability to complete safety critical tasks in the right way; manage and lead an operating team, work collaboratively with others, exercise command and control. Simulations also enable the assessment of competency requirements for tasks conducted during abnormal or emergency operations.
Scenario–based Exercises	If simulation exercises are not feasible to assess operator behaviour in for example, abnormal, emergency operational modes, use desktop or workplace exercises to construct a scenario and ask individuals to describe their responses to particular events.
Psychometric tests	Use valid and reliable psychometric tests to get insight into behavioural preferences and to assess whether the individual has the appropriate traits for decision–making in uncertainty, cross–functional team management and stress tolerance Examples of Psychometric tests include the 16 Personality Factor, Identity Questionnaire, and the Hogan Personality Inventory.

5.1.2 Recommended frequency of assessments

- Ideally annual/periodic assessments need to be included in the recertification/ requalification process of all licensed operators and need to incorporate assessments that will provide insight into the mental and emotional state of the individual as well their ability to meet the performance requirements of the job;
- Psychological assessments need to be conducted pre–placement and on an ad hoc basis when a mental health concern that may affect the worker's fitness for duty is suspected or identified;
- Individuals could be assessed every year using the same simulator/exercise method but using different scenarios.

5.2 SYSTEM ENGINEER

Due to the varied functional responsibilities of engineers, it may be more beneficial and pragmatic to identify specific safety–critical tasks associated with specific engineering roles and the assessment methods most suited to providing on–going competence assurance.

In most cases, many of the responsibilities, tasks and activities performed by system health engineers could have an impact on the safe and effective performance of the plant. Key responsibilities include [40]:

- Directing maintenance activities of operational nuclear power plants to ensure efficiency and conformity to safety standards;
- Conducting tests of nuclear fuel behaviour and cycles or performance of nuclear machinery and equipment to optimize the performance of existing plants;
- Conducting engineering analysis and develop recommendations to maintain and improve plant and system efficiency, reliability, safety, environmental compliance and cost performance;
- Identifying defects and failure modes, assessing current operating practices, identifying equipment deficiencies, and developing modifications to current configuration that will improve overall performance;
- Developing an integrated performance system for effective monitoring and optimization of units and systems;
- Recommending equipment, new concepts and techniques to improve performance or comply with changes in codes or regulations;
- Synthesizing analyses of test results and using the results to prepare technical reports of findings and recommendations.

Based on these responsibilities, some of the key competence requirements for system engineers are listed in TABLE 9 [40].

TABLE 9. SKILLS AND PERSONALITY ATTRIBUTES FOR SYSTEM ENGINEERS

Competency	Skills and Personality Attributes
Cognitive skills	• Analytical skills: Ability to use inductive and deductive reasoning to analyse system performance and determine the impact and consequences of changes in conditions, operations, and the environment • Complex Problem Solving: Ability to generate, evaluate and implement potential solutions to solve complex problems • Judgment and Decision Making: Ability to use judgement in evaluating potential safety risks and benefits in order to decide on the best course of action • Troubleshooting: Ability to determine causes of equipment failures and deciding what actions to take
Leading and managing skills	• Project management: Ability to plan, organise and control activities and resources to achieve specific goals and performance outcomes. • Programme management: Ability to manage several related projects designed to improve an organization's performance
Interpersonal skills	• Active listening: ability to listen attentively to colleagues to ensure that they obtain and understand all the necessary information to be able to make informed decisions • Communication: Ability to clearly and effectively communicate with corporate managers, engineers from other departments, maintenance and operating staff
Personality attributes	• Practical ingenuity: to generate pragmatic ideas to solve problems • Resilience: to persist when faced with challenges, obstacles and constraints • Flexibility: to respond and adapt to changes • Learning agility: to learn new things quickly and apply knowledge to new problems and new contexts

5.2.1 Proposed assessment practices and methods

Professional engineers are typically required to maintain their professional competence as stipulated in the competence requirements of professional bodies. Specific performance–based assessments need to be informed by the job and task analysis. Proposed generic methods of assessment for system engineers are described in Table 10.

TABLE 10. PROPOSED ASSESSMENT PRACTICES AND METHODS FOR SYSTEM ENGINEERS

Assessment Method	Description
Performance appraisal/review	Assessment of performance through the annual performance review/appraisal. This includes an assessment of performance results/outcomes, whether or not required performance standards were met, and the effectiveness of behaviour demonstrated. Include behavioural feedback from peers, colleagues and customers. Prevents overreliance on one person's judgement and reduces subjectivity
Observational assessments	Periodic performance reviews can include behavioural observations during relevant critical incidents, e.g. plant meetings, safety review meetings to evaluate behavioural capabilities such as communication, influence and critical thinking.

5.2.2 Recommended frequency of assessments

Individuals could be assessed every year using the performance appraisal/review process. Engineers who require authorization to perform safety critical tasks need to undergo a medical examination pre–employment and periodically at an interval to be determined by the risk analysis and job analysis, and on an ad hoc basis when a medical concern that may affect the worker's fitness for duty is suspected or identified.

5.3 EMERGENCY RESPONDERS

The skills and attributes needed to handle emergencies can differ to those used in normal operations. Personality attributes like stress tolerance (i.e. the ability to withstand stressors and remain calm and controlled in high stress situations) will drive an individual's behavioural response in an emergency situation and influence their ability to respond appropriately.

The key responsibilities of an emergency responder typically include [40]:

- Identifying the potential impact of a safety event or incident and predicting how the event will escalate;
- Identifying the source of the problem and the immediate, short term corrective actions;
- Correctly diagnosing the root causes and corrective actions, e.g. evacuation, isolation, shutdown;
- Developing emergency response plans or procedures;
- Structuring the response to the emergency in order to ensure that the best outcome is achieved;
- Delegating responsibilities to appropriate work groups/teams;
- Coordinating emergency services and emergency response staff.

Based on the generic responsibilities mentioned, potential competency requirements are listed in Table 11 [40].

TABLE 11. SKILLS AND PERSONALITY ATTRIBUTES FOR EMERGENCY RESPONDERS

Competency	Skills and Personality Attributes
Cognitive skills	• Integrative skills: Ability to integrate large amounts of information and extract key themes relevant to the different scenarios for handling the events • Critical Thinking: ability to use logic and reasoning to identify the strengths and weaknesses of alternative approaches and solutions to emergency situations • Decision–making: Ability to balance conflicting information and make decisions about emergency response actions under uncertainty • Prioritisation and aforethought: ability to prioritise the most important actions and identify the 20% actions that will have the most significant impact
Leading and Managing skills	• Communication: Ability to communicate with different stakeholder groups about the situation • Command and control: Ability to direct teams in the best strategy for resolving the event • Delegation: Ability to appropriately delegate responsibility for certain tasks to others and avoid task overload
Interpersonal skills	• Active listening: ability to listen attentively to colleagues to ensure that they have all the necessary information to be able to make informed decisions • Three–Way Communication: Ability to communicate safety critical information effectively using three-way communication practice consistently • Ability to solicit all the necessary information to deal with the event effectively
Personality Attributes	• Stress Tolerance: ability to remain calm and composed in high stress situations; ability to dealing calmly and effectively with others during high stress situations

5.3.1 Proposed assessment practices and methods

Opportunities to demonstrate emergency response skills during normal operations will be limited and it is unlikely that competence can be assessed on the basis of 'on the job observation'. Assuring continued competence would need to rely on simulated exercises of the possible scenarios that emergency responders are likely to face. These simulated exercises provide an opportunity to not only assess technical/operational competencies but also behavioural competencies such as the ability to coordinate emergency response teams, provide clear direction, communicate with diverse stakeholders and resolve conflict in an effective and efficient way. These simulations can be constructed to replicate real events or accident scenarios, providing an opportunity to get deeper insight into how individuals will react to stress triggers that closely approximate the real event, as shown in Table 12.

TABLE 12. SIMULATIONS TO REPLICATE REAL EVENTS OR ACCIDENT SCENARIOS

Assessment Method	Description
Simulations based on accident scenarios	Completion of a simulated exercise assessing the individual's skills to carry out emergency response management.
Scenario–based Exercises	If simulation exercises are not feasible use desktop or workplace exercises to construct a scenario and ask individuals to describe their responses to particular events. Asking individuals to provide insight into their reasoning will provide information about underpinning knowledge (e.g. knowledge of group processes

TABLE 12. SIMULATIONS TO REPLICATE REAL EVENTS OR ACCIDENT SCENARIOS

Assessment Method	Description
	and dynamics) and cognitive processes.
Behavioural Observations	Use behavioural observations to assess behavioural competencies during emergency plan exercises, e.g. stress tolerance, delegation, communication, teamwork.
Psychometric tests	Use valid and reliable psychometric tests to get insight into behavioural preferences and to assess whether the individual has the appropriate traits for decision–making in uncertainty, cross–functional team work and stress tolerance. Examples of Psychometric tests include the 16 Personality Factor, Identity Questionnaire, and the Hogan Personality Inventory.

5.3.2 Recommended frequency of assessments

- Medical examinations can be at pre–employment and periodically after at an interval to be determined by the risk analysis, or when medical concerns that may affect the worker's fitness for duty is suspected or identified;
- Behavioural assessments can take place annually during emergency plan exercises.

5.4 MAINTENANCE STAFF

Roles in maintenance include technicians and artisans across the mechanical, electrical and instrumentation disciplines. The roles and responsibilities are varied with maintenance staff performing high, medium, low or no safety risk activities work during various operational states. In this context it may be more beneficial and pragmatic to identify specific safety–critical tasks associated with specific maintenance roles and those assessment methods most suited to providing on–going competence assurance.

Examples of generic responsibilities include [40]:

- Conduct inspections and testing on equipment to diagnose problems;
- Performs routine maintenance, such as inspection and tests, replacing filters, or doing other preventive maintenance actions;
- Diagnose mechanical problems and determine how to correct using relevant procedures and work instructions;
- Repairs machines, equipment or structures, using the right tools or equipment such as precision measuring instruments or electrical or electronic testing devices.

Table 13 lists skills and personality attributes for maintenance staff.

TABLE 13. SKILLS AND PERSONALITY ATTRIBUTES FOR MAINTENANCE STAFF

Competency	Skills and Personality Attributes
Cognitive skills	• Problem–analysis: Ability to access and use relevant information to identify key issues and cause and cause–effect relationships • Problem–solving: Ability to identify alternative courses of action, taking into account relevant facts, resources, constraints and rules

TABLE 13. SKILLS AND PERSONALITY ATTRIBUTES FOR MAINTENANCE STAFF

Competency	Skills and Personality Attributes
Interpersonal skills	• Active listening: ability to actively listen attentively to colleagues and solicit all the necessary information to deal with the event effectively • Communication: Ability to communicate safety critical information effectively and ensure that relevant stakeholders have all the necessary information to be able to make informed decisions • Collaborative working: ability to build relationships with others; connect with individuals and engage in open and honest communication • Teamwork: Ability to work effectively with others (within and across functional boundaries) to accomplish goals
Personality Attributes	• Attention to Detail: thorough in completing work tasks and following detailed procedures • Stress Tolerance: ability to remain calm and composed in high stress situations; ability to dealing calmly and effectively with others during high stress situations • Adaptability: Able to adapt to changes in people, processes and organizational direction

5.4.1 Proposed assessment practices and methods

Table 14 lists the recommended assessment methods for maintenance staff.

TABLE 14. PROPOSED ASSESSMENT PRACTICES AND METHODS

Assessment Method	Description
On the job behavioural observations	Use observational assessments to assess behaviours during normal or routine maintenance activities, e.g. rule compliance and adherence, ability to pay attention to detail, verbal communication skills, questioning attitude, using human performance tools for example, three–way communication, self–checking and verification.
Scenario–based Exercises	If simulation exercises are not feasible use desktop or workplace exercises to construct scenarios for performing high–risk maintenance activities during abnormal or emergency conditions. This is useful to assess behaviours which cannot typically be observed through on–job assessments and in normal operational modes.

5.4.2 Recommended frequency of assessments

— Maintenance workers who require authorization to perform safety critical tasks need to undergo a medical examination pre–employment and periodically at an interval to be determined by the risk analysis and job analysis, and on an ad hoc basis when a medical concern that may affect the worker's fitness for duty is suspected or identified;

— Similarly, these individuals need to undergo a psychological assessment pre–employment and on an ad hoc basis when there is a concern that a mental or emotional health concern may affect the individual's fitness for duty;

— Individuals could be assessed every year using the performance appraisal/review process.

5.5 NUCLEAR SECURITY PERSONNEL

Employees who occupy roles related to the security of the nuclear facility typically have access to nuclear and radioactive material. This access can compromise the safe operation of the facility through infrastructure sabotage or the release of sensitive information. Thus, the trustworthiness of security personnel is important to the safety and security of a nuclear facility.

Examples of the key responsibilities of security personnel include the following [36]:

— Securing entrances and exits to buildings or facilities;
— Responding to any alarms and investigating all disturbances or suspicious activities;
— Monitoring and authorizing the access and exit of employees and visitors
— Blocking physical access to restricted areas and preventing unauthorized individuals from entering these areas;
— Responding to emergencies and providing assistance that may be required
— Reporting daily activities and any irregularities, for example damaged equipment;
— Patrolling the perimeter of facilities to prevent any unauthorized access and any potential security risk.

Table 15 lists the potential competency requirements for security personnel.

TABLE 15. SKILLS AND PERSONALITY ATTRIBUTES FOR SECURITY PERSONNEL

Competency	Skills and Personality Attributes
Cognitive skills	• Problem–solving skills: Ability to identify define the problem, potential causes and alternatives for approaches to resolve the problem • Situational awareness: Ability to identify process and understand critical elements of information about what is happening in the situation around you
Interpersonal skills	• Active listening: ability to listen attentively to colleagues to obtain all the necessary information to be able to make informed decisions • Communication: Ability to communicate security information effectively • Teamwork and cooperation: Ability to work effectively with team members and cooperate with others to achieve organizational goals
Personality Attributes	• Trustworthy: Can be relied upon to do what is right consistently; honest, truthful and dependable • Vigilant: Remains vigilant in following and adhering to rules, procedures and standards consistently • Questioning: Does not accept things at face value, asks questions • Assertive: Openly expresses thoughts and feelings in all situations, willing to do so even if the person/team is at a more senior level • Emotional self–control: Maintains composure, keeps emotions in check and controls emotional expression even in very difficult situations • Stress Tolerance: Maintains an effective ability to access knowledge quickly under

TABLE 15. SKILLS AND PERSONALITY ATTRIBUTES FOR SECURITY PERSONNEL

Competency	Skills and Personality Attributes
	stress and carry out a sequence of actions free from error in high stress situations

5.5.1 Proposed assessment practices and methods

Table 16 lists the recommended assessment methods for security personnel.

TABLE 16. PROPOSED ASSESSMENT PRACTICES AND METHODS FOR SECURITY PERSONNEL

Assessment Method	Description
Security checks and Vetting	Conduct criminal checks with law enforcement agencies to determine any prior arrests, criminal charges or convictions; determine any emerging security issues or concerns that pose a risk to the security at high security nuclear facilities.
Occupational fitness assessment	Provide assurance that the employee remains physically capable of safely performing their tasks.
Initial and periodic drug and alcohol testing	Identify if there are any indications of the use of drugs or alcohol while on duty which may cause physical or mental impairment.
Psychometric tests	Use valid and reliable psychometric tests to gain insight into behavioural preferences and to assess whether the individual has the appropriate personality attributes to perform a security role – namely rule compliance, conscientiousness, emotional independence, honesty, and reliability.

5.5.2 Recommended frequency of assessments

- Both initial assessments and periodic assessments need to be conducted for personnel directly supporting nuclear security, for example, guard/response forces, nuclear material accounting and control personnel;
- Assessments aimed at establishing trustworthiness need to be conducted on a graded approach depending on the level of security access associated with the specific role/position;
- All security staff would typically undergo a medical examination pre–employment and repeated at least every two years to assure on–going fitness for duty. Ad hoc medical examinations may also be conducted when a medical concern that may affect the individual's fitness for duty is suspected or identified;
- For sites that employ specialist nuclear response force teams, medical examinations can also be conducted if the person wishes to return to duty after any period of extended leave greater than six months;
- All nuclear security officers would typically complete a physical assessment at selection, annually or when a physical health concern is identified;
- Individuals could be assessed every year using the performance appraisal/review process.

5.6 CONTRACTOR STAFF

Contractor staff is defined as any personnel working for a nuclear power plant who are not directly employed by the nuclear power plant including short–term, long–term, on–site and off–site workers [20].

All contractors involved in the construction, operation and maintenance of a nuclear facility can have an impact on safety, performance and security. Contractor organizations are expected to provide competent staff who can meet required performance standards. Minimum assessment practices to identify and select suitable contractor staff need to form part of the contractual agreement with contracting organizations. Ideally, the assessment and auditing of the contractor organization's recruitment and selection process would form part of the supplier accreditation and certification process.

Competence assurance process and practices need to be informed by the following principles:

- Contractor competence to be formally assessed and documented;
- Final responsibility for competence assurance rests with the contracting organization;
- Documents or records related to education, training, work experience and past performance to be verified;
- Performance assessment evaluations need to be conducted during or after work is performed.

5.6.1 Proposed assessment practices and methods

Table 17 lists the recommended assessment practices during the plant life cycle stages.

TABLE 17. RECOMMENDED ASSESSMENT PRACTICES DURING THE DIFFERENT STAGES OF PLANT'S LIFE CYCLE

Life Cycle	Specific Assessments	Generic Assessments
Commissioning	Observations	• Qualification verification • Standardised interview • Reference checks • Background checks • Security Vetting • Past performance reviews
Operation	Long–term contractors occupying safety–critical roles or performing safety critical tasks should be subjected to the same periodic evaluation requirements as permanent staff.	
Outages	Contractors performing safety–critical work during outages should complete on–site checks and verification of qualifications and undergo drug and alcohol testing.	
Decommissioning	Observations	

6 ROLES AND RESPONSIBILITIES IN THE DEVELOPMENT, IMPLEMENTATION AND SUSTAINABILITY OF A BEHAVIOURAL ASSESSMENT PROGRAMME

6.1 AUTHORISED/ON–SITE MEDICAL PRACTITIONERS

The medical examination determines whether an employee has a physical and/or mental impairment that may limit or prevent them from performing their tasks/duties in a safe and reliable manner. Annual medical evaluations may also assist in the early identification of any medical concern. The key responsibilities of the medical practitioner are to:

- Conduct medical screening tests and examinations;
- Drug and alcohol testing;
- Identify any medical conditions that may adversely affect the individual's ability or capacity to carry out assigned tasks;
- Provide expert medical opinion on fitness for duty.

6.2 LINE MANAGERS

Line managers and supervisors are accountable for the performance of the teams that they lead and manage. Providing support, training, coaching or development that individuals may need to fulfil performance requirements is part of their leadership role. This includes setting and communicating clear performance expectations, continuous evaluation of performance and ensuring that the necessary corrective action is taken to address any performance gaps or deficiencies. Specifically, supervisors of staff in safety critical roles need to:

- Establish trust–based relationships for open communication with employees;
- Set, communicate and reinforce performance expectations that include behavioural requirements;
- Clearly communicate the objectives, scope and requirements of the periodic and ad hoc assessments;
- Conduct performance reviews on a regular basis to assess whether performance requirements are being met, identify any performance gaps and factors that may be impacting the employee's ability to meet performance expectations;
- In 'one to one discussions' reveal any concerns or problems relevant to the individual's capability and capacity to perform their tasks;
- Conduct behavioural observations in the work environment;
- Identify early warning signals or behavioural indications of possible mental, physical or emotional ill–health;
- Report any concerns to the authorised medical practitioner;
- Ensure that employees attend necessary assessments in a timely fashion.

6.3 PSYCHOLOGIST

The organizational psychologist determines the individual's psychological fitness during the pre–employment process and during the periodic re–evaluation process. Specific responsibilities include:

- Determine the psychological assessment process;
- Identify and select valid, reliable and fit–for–purpose assessment tools that can be used throughout the employee life–cycle;
- Conduct the assessments and/or or supervise those components of the assessment battery performed by suitably qualified personnel, for example, Human Resource Practitioners;
- Conduct the psychological interview and/or assist with the selection or progression interview;
- Verify whether the worker is psychologically capable of safely and competently performing their tasks;
- Specify any temporary or permanent work restrictions.

6.4 EMPLOYEES

In addition to their regular duties, employee responsibilities include:

- Attending periodic assessments when required to do so;
- Carrying out self–assessment and reporting of any problems or factors that may impact job performance to their line manager;
- Seeking confidential advice from health professionals or employee–wellbeing practitioners when experiencing any personal problems that may impair performance;
- Proactively seeking support or counselling through the Employee Assistance or equivalent programme for any personal stress, trauma or problems they may be experiencing at work or at home;
- Peer reporting – identifying and reporting any concerns about observed patterns of behaviour that may have potential negative safety, performance or security consequences.

6.5 HR PROFESSIONALS

HR professionals will provide both generalist and specialist services in the development and implementation of the assessment process. This includes:

- Assisting with or conducting the job and task analysis;
- Formulation of competency-based role/job profiles;
- Conducting behavioural interviews, behavioural simulations and exercises;
- Leading any necessary consultation processes with the line management, and advise cases where employees are found to be unfit for duty;
- Providing detailed and country specific knowledge of employment law;
- Reviewing proposed assessment practices within the context of applicable legislation, identify any areas of non–compliance to legislation or of potential concerns and make any necessary adjustments.

6.6 LEGAL PROFESSIONALS

Legal professionals assist in the review of proposed assessment practices within the context of applicable legislation and identify any areas of non–compliance to legislation or potential concerns.

6.7 EMPLOYEE ASSISTANCE PROGRAMME/PRACTITIONER

- Provide confidential assessment, referral services, and treatment monitoring to employees who have problems that could adversely affect their abilities to safely and competently perform their duties;
- Offer short–term counselling, coaching and training to help employees manage any work and/or personal stress or trauma;
- Report an employee's condition if they pose or have posed an immediate danger to themselves or others, for example if the individual is perceived to have the potential for self–harm, inflict harm on others or has a continuing substance abuse disorder that might impair work performance in the future.

6.8 SENIOR MANAGERS AND EXECUTIVES

- Review and authorise the Assessment Policy which details the purpose of assessments, the principles that will inform assessment practices, the scope of the policy as well as roles, responsibilities and rights;
- Review and approve the competency framework;
- Demonstrate visible support for the assessment process and practices, including evaluation of implementation by line managers;
- Clearly articulate the policy and how this will be applied to selection, progression, training, development and competence assurance;
- Set and communicate stakeholder expectations of involvement;
- Participate in the development of the assessment process;
- Demonstrate role model expected behaviour daily.

7 RECOMMENDATIONS FOR LEADERSHIP AND MANAGEMENT ROLES AND RESPONSIBILITIES

7.1 OVERVIEW OF THE IMPACT OF LEADERSHIP BEHAVIOUR ON EFFECTIVE PERFORMANCE

Leaders are responsible for establishing a strong safety culture. Consistency and alignment in leadership behaviour is critical in embedding a strong safety and performance-based culture. Any inconsistencies in leadership behaviour across the organization will send out conflicting messages and may undermine the impact of any other intervention focused on bringing about a positive step change in organizational culture.

There are several mechanisms that transmit the desired organizational culture and shape how people perceive, think, feel, and behave. Primarily, leaders' individual and collective decisions, daily actions and interactions have the biggest impact. Primary mechanisms identified by Edgar Schein [38] are listed below (these operate simultaneously):

- What leaders pay attention to, measure, and control – this communicates and reinforces expected behaviour and performance standards;
- How leaders react to critical events, incidents and crises – the behavioural response (what leaders say and do) reflects their beliefs, values and attitudes, conveying messages about desirable and undesirable behaviour;
- How leaders allocate resources (financial and human) – criteria that leaders use to allocate resources conveys what is important, the organizational priorities and focus areas;
- The behaviour that leaders exhibit as role models, talk about, teach and coach – organizational members are influenced by the behaviours that leaders demonstrate daily through their words and actions;
- How leaders allocate rewards and status – reward and recognition activities communicate and positively reinforce results that leaders want and the behaviour that is required and encouraged;
- How leaders recruit, select, and promote – the criteria that are used to recruit, select and promote staff communicates and reinforces what is important, thereby shaping organizational behaviour;
- How leaders are recruited, selected and promoted – Recruiting, selecting and promoting the right leaders not only conveys what is important, it also potentially improves the collective leadership strength and the impact on organizational culture. Conversely, it can potentially weaken it by appointing managers or supervisors who demonstrate behaviour that conflicts with and undermines the desired organizational culture.

In summary, what leaders pay attention to, their reaction to critical incidents and the behaviours they model, reinforce, encourage and coach create the organizational culture. Leaders shape the way people think and behave, and the congruency between leadership behaviour and organizational culture has the biggest impact on safety and performance. IAEA publications [41, 42] emphasise the importance of leadership and the impact this has on establishing a sustainable safety culture that continuously evolves and improves. Selecting and appointing people to leadership or management positions who have the right skills, experience and capabilities is essential in creating an environment that enables high performance and drives organizational–wide behaviour that delivers the best results, safely.

Equally important is the development of a leadership pipeline to meet short, medium and longer–term succession requirements.

7.2 COMPETENCY REQUIREMENTS FOR EFFECTIVE NUCLEAR LEADERSHIP

To understand the competency requirements for effective nuclear leadership, it is important to draw the distinction between leadership and management. Table 18 is based on these, which are summarized by Kotter [43].

TABLE 18. FUNCTIONS OF LEADERSHIP AND MANAGEMENT

Leadership	Management
• Produces Change and Movement	• Produces Order and Consistency
Establishing Direction	Planning and Budgeting
• Create a compelling vision	• Establish agendas
• Clarify the 'big picture'	• Set timetables
• Set strategies	• Allocate resources
Aligning People	Organizing and Staffing
• Communicate goals	• Provide structure
• Seek commitment	• Determine and appoint to roles
• Build teams and coalitions	• Establish rules and procedures
Motivating and Inspiring	Controlling and Problem Solving
• Inspire and energize	• Develop incentives
• Empower subordinates	• Generate creative solutions
• Satisfy unmet needs	• Take corrective action

Using this distinction as basis, management competencies will typically include:

- Planning: the ability to programme activities and tasks, e.g. business planning; work planning, resource planning;
- Organizing: the ability to schedule tasks and activities to achieve weekly and daily goals; acquire, allocate and match resources
- Delegating: the ability to assign tasks to people, assign authority and responsibilities and set to work, e.g. conduct pre–job briefings;
- Monitoring and controlling performance: observe and record performance, assess whether required performance standards are met (e.g. compliance to rules, policies, procedures, work instructions) through observation, assessments, audits, reporting, and performance management;
- Problem–solving – ability to analyse problems, conduct a root cause analysis and implement corrective and preventative actions.

Leadership competencies would include the following:

- Provide direction: ability to communicate, engage others and align every effort and contribution to achieve performance expectations, goals and objectives;

- Influence: ability to influence others (internal and external stakeholders) to take action and deliver performance objectives without having to rely on positional power;
- Motivate and inspire: ability to inspire people to overcome obstacles, find new ways of doing things and engender commitment to perform and achieve outstanding results;
- Coaching: ability to conduct behaviour–based performance observations, and use effective questioning and active listening to coach individuals and teams for performance improvement;
- Fostering teamwork and building relationships: ability to build relationships within the team and across organizational boundaries to achieve collaborative working and collective accountability.

A number of factors will influence the ideal leadership profile in a nuclear organization: the organizational phase (new build, operational, decommissioning), the existing and preferred organizational culture and the composition of the existing leadership team (the team that the leader will form part of and the team that the leader will manage/lead). There are numerous leadership competency frameworks which detail the competency requirements for effective leadership and are applicable across industries. The nuclear leadership profile needs to consider the challenges and ~~unique~~ demands of leadership in a safety–critical context. Key factors applicable to the operation of a nuclear facility that will influence the competencies that are essential for managers/leaders are [35]:

- Organizational culture;
- Safety and security culture;
- Regulatory requirements as stipulated by oversight organizations;
- Technical requirements to operate the plant or facility;
- Corporate and administrative policies;
- Business environment (whether the organization is regulated, state owned or in an open market);
- Organizational life–cycle.

Nuclear Industry Standards focused on ensuring safe and reliable nuclear power plant operation, detail individual and collective leadership attributes that will maximize nuclear safety by creating an environment that contributes to the development of a strong safety culture. These standards, listed below, define ‘what good nuclear leadership looks like’ and together with the operating context and associated leadership capability requirements, are vital in informing the organizational leadership capabilities:

- INPO 15–005. Leadership and Team Effectiveness Attributes [44];
- INPO 15–012. Behaviours and Actions that Support Leadership and Team Effectiveness, by Organizational Level [45];
- World Association of Nuclear Operators (WANO) PO&C 2013–1. Performance Objectives and Criteria [46];
- IAEA Safety Standards Series No. GSR Part 2. Leadership and Management for Safety [42].

For example, attributes for site senior leadership team effectiveness, defined by INPO are [44]:

- Horizontal alignment: how well team members work cross–functionally;
- Vision, mission and priorities: clarity and alignment on how to achieve goals;

- Expectations, roles and responsibilities: these are clear and understood; includes teamwork;
- Processes and structure support teamwork;
- Standards: common pursuit for higher standards;
- Urgency: concurrence on when and how to address important issues;
- Accountability: individual and collective accountability for performance;
- Workforce engagement: collaborative efforts to involve employees.

Key questions to guide the development of a leadership competency profile:

- What are the leadership challenges and demands facing our organization?
- What leadership behaviour is required to lead effectively in a safety–critical context?
- What leadership behaviour is needed to embed a strong, positive safety culture?
- What skills and behaviour are needed to implement the business strategy?
- What leadership capabilities are needed to embed the organizational culture that will deliver business results?
- What leadership behaviour is essential to establishing a nuclear safety culture that is fuelled by both compliance (to rules, processes and procedures) and commitment (to deliver the best work, continuously improve)?
- What personality attributes differentiate leaders who inspire commitment to take action that will bring about high performance?
- Which leadership characteristics are the most important in bringing about a positive shift in safety culture and organizational performance in our organizational context?
- What specific personality attributes are required to achieve performance success?
- What generic behavioural competencies apply to all leaders in our organization?
- What specific behavioural competencies are required by level or function?
- What collective leadership capabilities are required to implement strategies and embed the desired organizational culture?

7.3 LEADERSHIP ASSESSMENTS FOR RECRUITMENT, SELECTION AND DEVELOPMENT

Effective practices for the selection and development of leaders are based on a systematic approach to the assessment in order to objectively gather relevant information about the experience, skills knowledge and attributes of managers and supervisors. Assessment practices need to determine whether the individual has the personality characteristics associated with the management/leadership role and the aptitude and ability to perform tasks associated with the role.

Leadership effectiveness can be assessed in many different ways and at various levels depending on the assessment purpose and objectives. Ideally leadership assessments need to be holistic and capture the broad dynamics and various aspects of daily leadership behaviour. Assessment tools may include questionnaires, 360-degree evaluations, personality assessments, behavioural simulations and assessment centres. Using various assessment tools will help to arrive at a comprehensive understanding of overall leadership effectiveness of the individual, the leadership team and the organizational leadership capability.

Assessment tools and methodologies need to evaluate existing leadership capabilities against desired performance requirements and leadership attributes.

7.3.1 Recruitment and selection

Assessment tools recommended for the recruitment and selection of leaders typically include a structured, competency–based interview, reference checks and psychometric tests, as shown in A graded approach can be used with basic assessment tools being used for entry–level positions and a more robust assessment process for senior leadership positions (see Fig. 10).

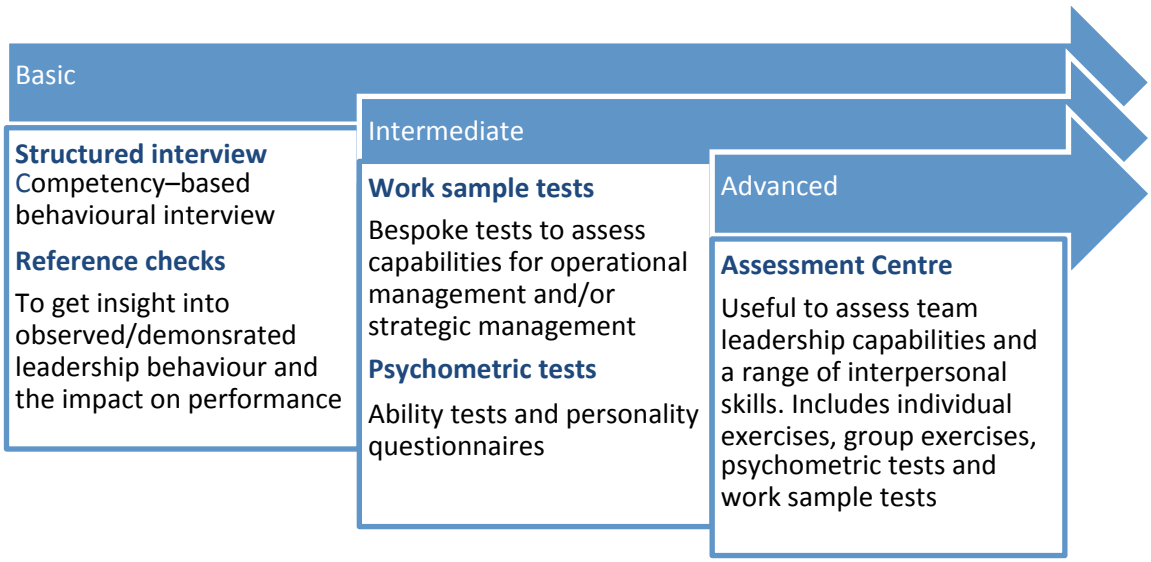

FIG. 10. Recommended assessment tools for the recruitment and selection of leaders

7.3.2 Development of Nuclear Leaders

Leaders need to be able to create an enabling work environment, embed a strong safety culture and successfully drive the collective organizational action to deliver the organization's vision, strategic objectives and operational goals. Successful performance requires aligned leadership which consistently demonstrate a range of common attributes, for example, accountability, integrity and inclusiveness. A holistic development programme focuses on multiple levels: individual, team and organizational leadership.

The level of analysis will determine the choice of assessment tools. Overreliance on one assessment tool needs to be avoided; multiple assessment data that will give insight into behavioural patterns and the systemic factors influencing leadership behaviour needs to be used.

The following charts provide a high-level overview of the assessments that can be conducted at the individual, team and organization levels to assess leadership capabilities and identify development areas:

— Level 1 – these are the basic or fundamental assessment tools/techniques that can be used which will require the least amount of effort, time and resources;
— Level 2 – the level of complexity increases and many of the tools listed here need to be administered and interpreted by an accredited test user and/or psychologist;
— Level 3 – the level of depth and insight that these assessments provide is high and require significant organizational investment in terms of time, effort and resources.

7.3.2.1 Individual Level

The objective is to increase self–awareness of one's own leadership effectiveness; identify strengths and areas requiring specific development. Assessments are aimed at helping leaders to take an appreciative and critical look at themselves and their current leadership approach to and develop a personal development programme to improve their leadership effectiveness, as shown in Fig. 11.

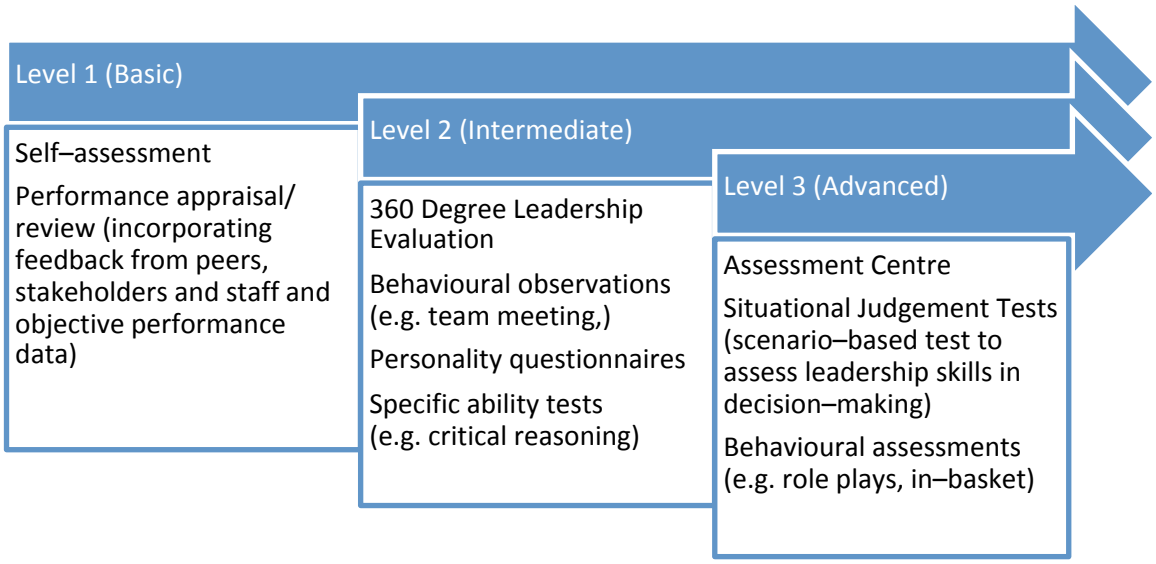

FIG. 11. Overview of the assessments for individual level

7.3.2.2 Team Level

The primary focus is the collective leadership team and the overall objective is to enhance the team's capacity to improve their collective behaviour, work more effectively within the team and across organizational boundaries. Team–based development provides an opportunity for cross–functional learning and relationship building and focuses on the connections between leaders, the strength of their collective actions, the alignment in their leadership behaviour and their overall influence on the leadership culture of the organization.

The strength of collective leadership behaviour and the impact on overall organizational performance is reflected in these following statements:

— "The ability of an organization to accomplish its goals does not depend solely on the force of will of a single great leader, or even upon the effectiveness of the organization's chain of command. These things are important, but don't in and of themselves help us understand why some organizations succeed where others fail. Instead, research has shown, we must understand leadership culture, as defined by the collective actions of formal and informal leaders acting together to influence organizational success." [47]

— "The nuclear SLT (Senior Leadership Team) is a true team in that members have complimentary roles, are committed to a common purpose – plant performance– and are held accountable for shared results…Although SLT members have significant direct

accountabilities, consistently high station performance is dependent upon the team working well together. The effective running of a nuclear site demands such teamwork in part because of the continual internal and external demands related to safety, regulation and licensing, production, and cost. The interdependence of the department functions to manage all these pressures on a daily, as well as strategic basis, makes effective teamwork essential to good plant performance." [48]

The goal of assessments is to obtain a deeper insight into team dynamics, explore the impact of individual and behavioural preferences on group processes, and identify the team's behavioural strengths and development areas to improve collective leadership capability. There are a range of assessments that can be used to assess the team's current functioning; these range from basic self–assessments to more robust behavioural simulations to observe the team in action as they work together on real issues, as shown in Fig. 12. A comprehensive needs analysis will typically include a review of the nuclear industry requirements for effective leadership against self–assessments, various best practice criteria and high performing attributes and observations.

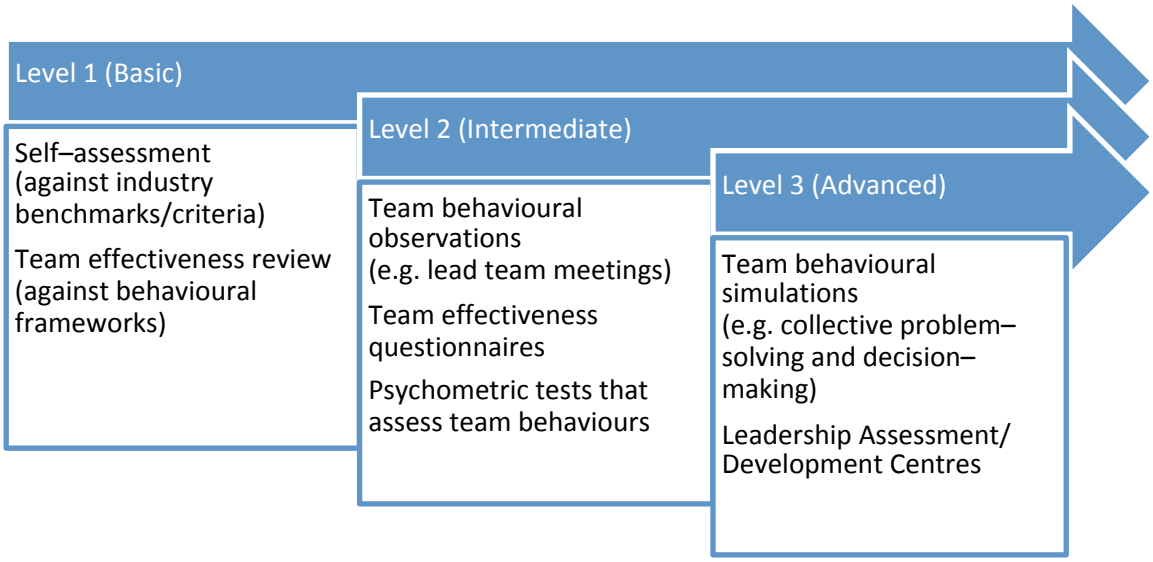

FIG. 12. Overview of the assessments for team level

7.3.2.3 Organizational Level

Focus at the organizational level allows identification of the core leadership capabilities that all leaders need to have to establish the organizational culture and environment that will deliver targeted business results. Assessment tools that provide an organizational level analysis of existing and future capability requirements are used for example culture surveys, employee engagement surveys, nuclear safety culture surveys, organizational effectiveness reviews, as shown in Fig. 13.

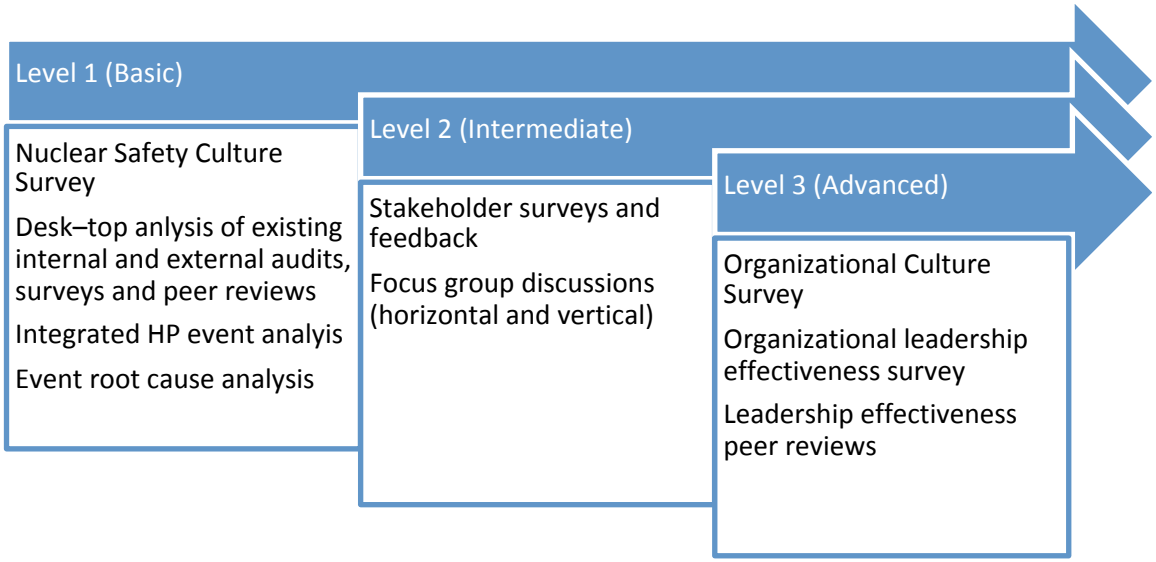

FIG. 13. Overview of the assessments for organizational level

Assessment tools used in selection and development of leaders are applicable to individual, team, organization, basic, intermediate and advanced levels.

7.3.2.4 Examples of assessment tools used in selection and development of leaders

(a) Work Sample Tests

Work sample tests are developed using critical incident information and performance requirements. These would involve presenting the individual with written or audio–visual information that reflects typical situations requiring leadership judgement and decision–making, for example, at senior management level this may involving reviewing safety culture survey results and developing a proposed plan of action, developing a strategy to resolve board tensions around competing priorities that have safety and performance implications, identifying the root causes of declining equipment reliability.

(b) Assessment/Development Centres

Traditional assessment centres evaluate leadership competencies by observing the leader in multiple simulation exercises. This usually involves multiple leaders and multiple assessors and duration ranges from one to four days. Various exercises and activities provide participants with several opportunities to demonstrate their ability or potential to apply leadership and management competencies in simulated, work-based scenarios, and identify strengths and areas for development. It makes use of customised work samples, case studies, role plays, group discussions and feedback to facilitate delegate/participant insight and growth. This assessment centre aims to provide individuals with a deeper insight into their leadership and management styles and behaviours. The development areas can then be incorporated into their personal development plans.

(c) 360 Degree Leadership Evaluation

The 360-degree evaluation provides multi–rate feedback on leadership capabilities. It usually consists of a list of questions based on a set of leadership competencies that are based on a

proven competency model or a model that has been specifically designed for a specific organizational context. The multi–rate feedback enables the individual being assessed to receive insights from a variety of people on their level of perceived effectiveness on several leadership dimensions. Behaviours are rated from observations made by the direct manager, self, peers and subordinates. These ratings are combined and integrated to provide an average rating for each of the respondent categories and then rolled up into an overall score per leadership dimension.

8 SUMMARY

Safe and effective performance at nuclear facilities depends on excellent human performance. Many Member States widely use competency assessments, tests and examinations for employee selection, licensing and authorization. In some cases, both technical and behavioural competencies have been defined and used to guide and inform observations and assessments. However, personality attributes that differentiate performance and predict successful job performance are not always clearly defined or assessed in an objective way.

This guide proposes practices and methods to identify and assess behavioural requirements that are essential to meet performance requirements in a highly proceduralized and regulated work environment, where the consequences of human error can have significant implications for the safe and effective performance of the individual, team and organization. A battery of assessments is required which will include the measurement of behavioural competencies of which personality attributes is an essential component. Psychometric tests, designed to assess personality attributes may be incorporated into a comprehensive, integrated assessment programme. The document is not intended to provide an in–depth, comprehensive overview of assessments, rather the intent is to provide a foundation upon which to develop sound, defensible and predictive assessment practices to identify, select and retain high performing nuclear professionals using pragmatic approaches throughout the various stages of the employee–lifecycle.

Integrating behavioural assessment practices to assess on–going competence and provide an assurance of competence is key to embedding a strong nuclear safety culture. Existing practices like on–the–job observations and performance reviews/appraisals are good starting points to embed behavioural assessments. In many Member States these practices are well–established and simply need to be reshaped to provide a more holistic assessment of behavioural competence and performance. Behavioural competencies required for various nuclear staff for example, operations, engineering, maintenance, emergency responders, security personnel and contractors are proposed as well as recommended assessment methods. These can be used to guide the development of competency–based job profiles and the choice of fit–for–purpose assessment methods.

The choice of assessment practices and methods needs to be based on a rigorous analysis of task–based performance requirements in order to establish and define measurable behavioural indicators. There may be differences between professional and technical requirements in different countries. Other factors such as country–specific legislation, cultural differences, and organizational constraints will influence the choice and selection of assessment practices that are fit for purpose. This document provides a systematic process of determining relevant and appropriate assessments based on contextual organizational factors and specific characteristics of the facility or activity. Annex VIII is a self–assessment that organizations can use assess existing assessment practices and tools to identify strengths of the current approach and potential areas for improvement.

Leaders are responsible for fostering a strong safety culture and their collective decisions, daily actions and interactions have the biggest impact on establishing a safe, secure and effective work environment [49]. Selecting and promoting the right person in leadership roles is crucial. Organizations need to ensure that these staffing decisions are based on more than the technical requirements of the position and include rigorous assessment practices to determine whether technically competent individuals have the necessary behavioural requirements to manage and lead individuals and teams, embed the desired organizational culture and drive the collective organizational behaviour which is required to achieve operational excellence and longer term strategic results.

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SUMMARY OF ANNEXES

Annex I provides a template for capturing and documenting the output from a risk assessment.

Annex II provides a template for a detailed competency–based job profile, which is the output of a task analysis.

Annex III provides a checklist of key questions and considerations for conducting job and task analysis.

Annex IV. provides a description of a process for developing a Situational Judgement Test.

Annex V provides an overview of the potential advantages and disadvantages of various assessments.

Annex VI is detailed questionnaire to guide the selection of valid and reliable psychometric tests.

Annex VII is a draft nuclear professional behavioural profile, targeted at the individual contributor level and based on WANO Traits of a Healthy Nuclear Safety Culture (PL-2013-1), which describes the essential traits and attributes of a healthy nuclear safety culture.

Annex VIII is a self–assessment that organizations can use assess existing assessment practices and tools to identify strengths of the current approach and potential areas for improvement.

ANNEX I.
RISK ASSESSMENT TEMPLATE

Annex I provides a template for capturing and documenting the output from a risk assessment.

TABLE I-1. RISK ASSESSMENT TEMPLATE

Role	Job title					
Key responsibilities	Key responsibilities			Detailed tasks and activities		
Risks and hazards	Key activities that impact security			Key activities that impact safety		
	Activity	Consequence	Likelihood	Activity	Consequence	Likelihood
Level of risk activities	High risk activities		Medium risk activities		Low risk activities	
Job stressors	Demands					
	Control					
	Other					

ANNEX II.
COMPETENCY BASED JOB PROFILE TEMPLATE

Annex II provides a template for a detailed competency–based job profile, which is the output of a task analysis.

TABLE II-1. COMPETENCY BASED JOB PROFILE TEMPLATE

Position/job/role				
Reporting lines				
Purpose of the role				
Entry level requirements	Educational qualification			
	Related experience			
	Security vetting requirements			
Essential responsibilities	Key performance areas	Detailed activities tasks	Key performance indicators	Competencies (technical and behavioural)
Competency requirements critical for safety performance	Knowledge			
	Skills			
	Personality attributes			

ANNEX III.
CHECKLIST AND KEY QUESTIONS FOR JOB AND TASK ANALYSIS

Annex III provides a checklist of key questions and considerations for conducting job and task analysis.

TABLE III-1. CHECKLIST AND KEY QUESTIONS FOR JOB AND TASK ANALYSIS

Job identity	Job title; division/department; location/facility; reporting relationship.
Responsibilities	
What tasks/activities are performed?	
How are the tasks performed?	
Why are they performed?	
What are the required standards of performance?	
What are the required outcomes of performance?	
What evidence will indicate successful performance?	
What measurable criteria can be used to judge performance?	
What is the frequency of specific tasks?	
Competency requirements	
• Knowledge	
What are the minimum formal education requirements?	
What specialized expertise is needed?	
What experience is relevant to this role?	
What length of experience is required?	
• Skills	
What cognitive skills (analytical, abstract and problem solving) are required?	
What physical capabilities (visual, dexterity, etc.) are required to perform tasks or activities?	
What interpersonal skills (e.g. influence, communication) are needed to achieve the results?	
What management and leadership skills (e.g. planning, coaching) are critical in this context?	

TABLE III-1. CHECKLIST AND KEY QUESTIONS FOR JOB AND TASK ANALYSIS

• Attributes	
What personality attributes will influence the behaviour required for effective performance?	
• Specific demands	
What are the physical demands on this role (e.g. exertion, environment, hazards, exposure to unpleasant conditions)?	
What are the special demands (e.g. travel, work hours, isolation and independence)?	
What are the demands on emotional and mental well–being?	

ANNEX IV.
PROCESS FOR DEVELOPING A SITUATIONAL JUDGEMENT TEST

Annex IV provides a description of a process for developing a Situational Judgement Test.

1. Design decisions: response format, type of scenarios.
2. Workshop/interviews with role experts:

— Their view of the most important types of behaviour;
— Examples of good performance, context;
— Examples of poor performance, context.

3. Define critical behaviour for measurement.
4. Identify real life situations that demonstrate this behaviour.
5. Write draft scenarios, create several draft actions for each scenario.
6. Remove scenarios and actions that are ambiguous.
7. Ask role experts to rate the effectiveness of each action.
8. Drop the scenarios/actions where experts' ratings vary considerably.
9. Pilot testing with a population that is equivalent to the candidate group.
10. Drop items with poor differentiation and test statistics results.
11. Finalize test.
12. Develop norms.

ANNEX V.
POTENTIAL ADVANTAGES AND DISADVANTAGES OF VARIOUS ASSESSMENTS

Annex V provides an overview of the potential advantages and disadvantages of various assessments.

TABLE V-1. POTENTIAL ADVANTAGES AND DISADVANTAGES

Assessment	Advantages	Disadvantages
Education requirements verification	Effective way to shortlist applicants when educational qualifications are a minimum requirement Can be useful for certain technical, professional, and higher-level jobs to guard against gross mismatch or incompetence.	In some cases, it may be difficult to demonstrate job relatedness of education requirements.
Knowledge test	Can reduce business costs by identifying individuals for training who meet minimum requirements. Are typically less likely to unfairly discriminate based in group differences e.g. gender and race than other types of tests. May be viewed positively by test takers who see the close relationship between the test and the job. Will not be influenced by test taker attempts to impression manage or fake responses.	May be inappropriate for jobs where knowledge may be obtained via a short training period.
Structured interview	Questions based on competency requirements of the role tend to be valid. More efficient than unstructured interviews Provides more consistency in the assessment process than an unstructured interview Enables an assessment of interpersonal skills such as verbal communication, influence and impact that are not measured effectively by electronic or written assessments Typically, less likely to unfairly discriminate against group differences e.g. gender and race than other types of tests. May reduce adverse impact if used in conjunction with other tests	Unstructured interviews typically have poor validity Skill of the interviewer is critical to the quality of interview (interviewer training can help). May be affected by interviewer subjectivity, rating errors and unconscious biases. Time–consuming and costly when many individuals need to be assessed. Individuals may fake their responses to create a positive impression and outcome.

TABLE V-1. POTENTIAL ADVANTAGES AND DISADVANTAGES

Assessment	Advantages	Disadvantages
Cognitive ability tests	Useful predictors of performance across a wide variety of jobs, especially for more complex jobs. Fairly y easy and cost effective to administer; can be administered to large numbers electronically or online methods Predictive performance validity Not sensitive to test taker attempts to impression manage or fake responses.	Use of ability tests can result in high levels of adverse impact. . More likely to unfairly discriminate against group differences e.g. gender and race than other types of tests.
Physical ability test	Produces valid inferences regarding performance of physically demanding tasks. Can identify prospective employees who are physically unable to perform essential tasks and activities Will not be influenced by attempts to fake responses or create a positive impression.	More likely to differ in results by gender than other types of tests. Can be expensive to purchase equipment and administer. May be time consuming to administer.
Work sample tests	Work sample tests have relatively high predictive validity for successful job performance Usually result in less adverse impact than ability tests Higher face validity for test takers due to the link between the test and the actual job. Less likely to be influenced by test taker attempts to impression manage or fake responses. Can help a prospective employee to assess person-role fit Useful to assess application of competencies in a specific work context	Work–sample tests may be expensive and time consuming to develop. May not assess the ability or potential to learn new tasks.
Personality inventories	Predictive validity evidence exists for some personality assessments in specific situations. May help reduce adverse impact when integrated with other assessment data. Easy and cost–effective to administer to large numbers. Demonstrated to produce valid inferences for several organizational outcomes (e.g. retention). .	Usually no right or wrong answers, therefore sensitive to faking or providing socially desirable answers to create a positive decision outcome. May contain questions that do not appear job related or are only indirectly relevant to job performance.

TABLE V-1. POTENTIAL ADVANTAGES AND DISADVANTAGES

Assessment	Advantages	Disadvantages
Honesty and integrity measures	Have been shown to be valid in some cases. Easy and inexpensive to administer. Typically, less likely to unfairly discriminate against group differences e.g. gender and race than other types of tests. Can be administered to large numbers electronically or online easily. Can be cost effective to administer. Does not require skilled administrators.	Strong concerns about invasion of privacy (use only as part of a broader assessment battery) therefore some countries may have restrictions on their usage. Possibility of faking or providing socially desirable answers way to create a positive decision outcome. Restricted usage (generally recommended for use in pre–employment screening only). Should not be used as a sole source of information, instead combined with interviews, reference checks, background checks, etc.
Reference checks	Can be used to verify information previously provided by applicants. May encourage applicants to provide more accurate information.	Reports are almost always positive; they do not typically help differentiate between good workers and poor workers.
Assessment centres	Good predictors of job and training performance, managerial potential, and leadership ability. Can reduce turnover and operational costs by improving the quality of employment decisions High face validity for test takers due to the close relationship between the assessments and the job. Strong focus on behaviour demonstration than simply assessing characteristics. Typically, less likely to unfairly discriminate against group differences e.g. gender and race than other types of tests.	Can be expensive to administer and develop. Can be labour intensive (requires multiple assessors, role–players, etc. Time intensive (requires more time to administer than most other methods). Specialized training required for assessors; their skill is essential to the quality of assessment centres. Can be challenging to maintain standardisation across multiple occurrences and locations.
Medical examination	Can help ensure a safe work environment when use is consistent with relevant federal, state, and local laws.	There is a risk of violating applicable regulations (a written policy, consistent with all relevant laws, should be established to govern the entire medical testing programme).
Drug & alcohol test	Can help ensure a safe and favourable work environment when programme is consistent with relevant legislation.	An alcohol test is considered a medical exam and applicable law restricting medical examination in employment must be followed. There is a risk of violating applicable regulations (a written policy, consistent with all relevant laws, should be

TABLE V-1. POTENTIAL ADVANTAGES AND DISADVANTAGES

Assessment	Advantages	Disadvantages
		established to govern the entire drug or alcohol testing programme).

Based on SIOP Types of Employment Tests retrieved from https://www.siop.org/Business-Resources/Employment-Testing/Test-Types

ANNEX VI.
QUESTIONS TO GUIDE THE SELECTION OF VALID AND RELIABLE PSYCHOMETRIC TESTS

Annex VI is detailed questionnaire to guide the selection of valid and reliable psychometric tests.

1. Determine legal, professional and ethical requirements

- What are the current professional, legal and ethical issues relating to the use of tests in selection, progression and other aspects of the employee life cycle?
- What are the codes of conduct and good practices relating to the use of tests, reporting, feedback and storage of test data?
- What social, cultural and political contextual factors may affect assessment results, their interpretation and the use to which they are put?
- How can we prevent the potential for test misuse or for misunderstanding the interpretation of test results?

2. Establish test validity and reliability

- What do we want to measure/assess/test?
- Which assessment methods will best serve us? How will we best assess the behavioural requirements?
- Which psychometric assessments have demonstrated reliability and validity with respect to the relevant target population?
- Which of these assessments will have face validity in perceived fairness and relevance to those who will be involved in their use?
- Which assessments have the highest practicality, including time required, costs and resource needs?
- Which assessments have clear supporting technical documentation?
- Is the test content related to key aspects of the real job?
- Is there a correlation between the test results and the performance of existing job holders?
- Does the test have predictive validity? Is there a positive correlation between the test scores and job performance?

3. Evaluate possible tests against specified criteria

Assessment method tool	Reliable?	Valid?	Culture fair?	Technical documentation?	Cost effective?	Time efficient?
Option 1						
Option 2		✓	✓	✓		
Option 3						
Option 4						

Option 5						

4. Documentation control

— How will the data be collected?
— Who will have access to the data and write reports?
— How would the reports be used?
— With whom will the reports be shared?
— How long the reports will be stored and for what purposes shall they be used?

5. Identify key safety critical roles and activities to include in the human performance reliability programme

— Which safety critical roles are associated with specific psychological demands?
— Which tasks pose a threat to safe, secure or effective performance if the operator is incapacitated?
— Which tasks, if not performed correctly, could have potential negative safety, security and performance consequences?
— Which tasks and/or roles pose potential hazards, risks or stressors for the employee, the organization and the community?
— Which roles should be included in the human reliability programme?

ANNEX VII.
DRAFT NUCLEAR PROFESSIONAL BEHAVIOURAL PROFILE

This behavioural profile is targeted at the individual contributor level and is based on WANO Traits of a Healthy Nuclear Safety Culture (PL–2013–1) [51], which describes the essential traits and attributes of a healthy nuclear safety culture.

The traits and attributes relevant at the individual level were extracted and behaviour indicators that demonstrate the internalization and demonstration of these traits are proposed. Relevant behavioural indicators were also extracted from INPO Traits of a Healthy Nuclear Safety Culture INPO 12–012, Revision 1 [38].

This profile has been developed as a basis to identify the core personality attributes that contribute to safe and effective performance of a nuclear professional within an organization seeking to establish and maintain a strong safety culture.

VII-1. PERSONAL ACCOUNTABILITY

— Personal accountability: takes personal responsibility and ownership for individual, team and organizational safety.

TABLE VII-1. SAFETY CULTURE TRAITS/CHARACTERISTICS

Safety culture trait/characteristic: All individuals take personal responsibility for safety. There is personal ownership for safety and a commitment to understand and follow standards and expectations	
Attributes	Behavioural indicators
Rule compliance and adherence Individuals at all levels of the organization adhere to standards and expectations	• Collates and considers all documentation relevant to the task being performed to ensure that work is performed safely and effectively; • Willingness and motivation to adhere to all rules, standards, policies and procedures at all times; • Remains vigilant in using human performance tools to ensure that rules, procedures and standards are adhered to; • Applies nuclear safety standards consistently in all situations; • Is attentive and engaged during pre–job briefs and post–job debriefs.
Ownership: Individuals demonstrate personal commitment to safety in their behaviours and work practices. They promote safe behaviours in all settings and coach others when necessary	• Willing to take ownership and responsibility not only for results, but also how results are achieved; • Individuals hold themselves personally accountable for modelling nuclear safety behaviour; • Actively participates in pre–job briefings and raises any nuclear safety concerns before work begins; • Takes responsibility for the preparation and execution of assigned work activities; • Takes ownership and accountability for actions, decisions and advice to others; • Ensures work is completed to the standards required;

TABLE VII-1. SAFETY CULTURE TRAITS/CHARACTERISTICS

Safety culture trait/characteristic: All individuals take personal responsibility for safety. There is personal ownership for safety and a commitment to understand and follow standards and expectations	
Attributes	Behavioural indicators
	• Takes the initiative to look for and identifies ways to further improve own/team's safety performance; • Identifies and raises nuclear safety issues and challenges, including those identified by others; • Looks for solutions to observed problems and issues; • Provides peer checks and offers constructive, positive challenge and coaching.
Collaboration: Individuals and work groups help each other obtain goals by communicating and coordinating their activities within and across organizational boundaries. Individuals understand and accept the value of diverse thinking in optimizing safety.	• Demonstrates a willingness to work jointly with others to fulfil responsibilities and coordinate activities across organizational boundaries; • Works collaboratively with others to develop ways to optimize safety performance; • Actively seeks to support others, shares tools and information; • Solicits information from others that will assist with the coordination of work activities; • Keeps team members informed about progress, communicating all safety critical information; • Communications with others are timely, frequent and accurate; • Individuals help all team members (permanent and supplemental personnel) understand and practice expected behaviours and actions.

VII-2. QUESTIONING ATTITUDE

— Questioning attitude: demonstrates a questioning attitude and openly voices concerns about anomalies, conditions, behaviours or activities that can adversely impact safety.

TABLE VII-2. SAFETY CULTURE TRAITS/CHARACTERISTICS

Safety culture trait/characteristic: Individuals remain vigilant for assumptions, anomalies, conditions, behaviours or activities that can adversely impact safety and then appropriately voice those concerns. All employees are watchful for and avoid complacency. They recognize that minor issues may be warning signs of something more significant. Individuals are aware of conditions and alert to potential vulnerabilities and then report them.	
Attributes	Behavioural indicators
Recognize Unique Risks: Individuals understand the unique risks associated with nuclear and radiation technology. They understand that the technologies are	• Demonstrate vigilance in using human performance tools to perform the task safely and effectively; • Proactive in looking out for potential problems, risks or threats that

TABLE VII-2. SAFETY CULTURE TRAITS/CHARACTERISTICS

Safety culture trait/characteristic: Individuals remain vigilant for assumptions, anomalies, conditions, behaviours or activities that can adversely impact safety and then appropriately voice those concerns. All employees are watchful for and avoid complacency. They recognize that minor issues may be warning signs of something more significant. Individuals are aware of conditions and alert to potential vulnerabilities and then report them.	
Attributes	Behavioural indicators
complex and may fail in unforeseen ways with significant consequences.	could result in safety hazards; • Recognizes potential risks, communicates this to others and take the appropriate actions; • Actions are determined to be safe before proceeding with next activities steps in the process; • Ask questions that triggers critical thinking about potential risks and hazards; • Consistently use a systematic approach to evaluate risks when taking actions or making decisions.
Avoid complacency: Individuals recognize and plan for the possibility of mistakes, unforeseen problems, and unlikely events, even with past successful outcomes.	• Demonstrates a willingness and motivation to learn from operating experience, best practices, etc., to bring about continuous improvement; • Takes the time out to ask questions that will help individuals/teams to learn from operational experience and plan for possible mistakes and problems; • Considers potential undesired consequences of actions prior to performing work and implements appropriate error reduction tools; • Performs a thorough review of the work site and the planned activity every time work is performed rather than relying on past successes and assumed conditions; • Asks questions that will lead to continuous improvement, e.g. why are we doing it this way? How can we perform this task in an even safer way? • Raise questions rather than accept whatever is happening or likely to happen; • Maintain a questioning attitude during pre–job briefings and job site reviews to identify and resolve unexpected conditions.
Question uncertainty: Individuals stop when uncertain and seek advice. The situation and risks are evaluated and managed before proceeding.	• Individuals stop work activities when faced with uncertain conditions, evaluate the potential risks, communicate with supervisors, and resolve the condition prior to continuing work activities; • Thinks through the risks, consequences and impact of actions and decisions when determining the best course of action; • Obtains different perspectives and advice on issues when facing uncertainty or ambiguous situations; • When appropriate, individuals consult system and equipment experts; • If a procedure or work document is unclear or cannot be performed as written, individuals stop work until the issue is resolved.

TABLE VII-2. SAFETY CULTURE TRAITS/CHARACTERISTICS

Safety culture trait/characteristic: Individuals remain vigilant for assumptions, anomalies, conditions, behaviours or activities that can adversely impact safety and then appropriately voice those concerns. All employees are watchful for and avoid complacency. They recognize that minor issues may be warning signs of something more significant. Individuals are aware of conditions and alert to potential vulnerabilities and then report them.	
Attributes	Behavioural indicators
Recognize and question assumptions: Individuals question assumptions and may offer different perspectives when they believe something is not correct.	• Applies a questioning attitude (versus blindly following a process, work instruction, or procedure); • Asks open questions to understand the issue fully and identify any assumptions that may be driving the decision to act; • Asks questions that dig deeper and encourages others to share more of their thinking; • Asks questions to fully understand the bases of operational and management decisions that appear to be contrary to nuclear safety; • Has the courage to openly voice thoughts, feelings and concerns even when it is different from that of the majority or a more senior person.

VII-3. TRUST BASED COMMUNICATION

— Trust based communication: Individuals communicate openly and candidly and demonstrate behaviour that conveys respect and builds trust-based relationships.

TABLE VII-3. SAFETY CULTURE TRAITS/CHARACTERISTICS

Safety culture trait/characteristic: Safety communication: Individuals communicate openly and candidly, both up and down and across the organization and with oversight, audit and regulatory bodies. Trust and respect permeate the organization. Individuals are encouraged to voice concerns, provide suggestions and ask questions. Differing opinions are expressed, encouraged, discussed, and respected.	
Attributes	Behavioural indicators
Open and honest communication: Individuals ask questions, voice concerns, and provide suggestions.	• Demonstrates openness and honesty in day to day behaviour; • Communicates openly and candidly, both up, down, and across the organization; • Willingness to share thoughts/feelings about technical and behavioural issues; • Willing to report risks, threats and deficiencies in processes, practices, policies, procedures or behaviour at the workplace; • Keep promises and commitments made to others; • Asks for help when needed, or when unsure.
Active listening: Differing opinions are listened to and respected.	• Responds with curiosity when hearing a different perspective; • Demonstrates active listening in verbal and non–verbal behaviour,

TABLE VII-3. SAFETY CULTURE TRAITS/CHARACTERISTICS

Safety culture trait/characteristic: Safety communication: Individuals communicate openly and candidly, both up and down and across the organization and with oversight, audit and regulatory bodies. Trust and respect permeate the organization. Individuals are encouraged to voice concerns, provide suggestions and ask questions. Differing opinions are expressed, encouraged, discussed, and respected.	
Attributes	Behavioural indicators
	using three-way communication to ensure understanding; • Listens without interruption and with the intent to understand (versus reply) when others offer their perspectives/opinions/views; • Shows a willingness to consider issues from other perspectives.
Seeks feedback from others on performance and demonstrates a willingness to act on feedback received.	• Open and willing to hear feedback about one's own performance (technical and behavioural); • Recognizes and acknowledges own weaknesses; • Individuals actively solicit feedback from others on task performance and safety behaviour; • Responds to feedback in an open, non–defensive manner, and demonstrates a willingness to act on feedback received.

VII-4. CONTINUOUS LEARNING

— Continuous Learning: learns values and actively seeks out opportunities for learning and development that will improve performance.

TABLE VII-4. SAFETY CULTURE TRAITS/CHARACTERISTICS

Safety culture trait/characteristic: Learning is highly valued. The organizational capacity to learn is well developed. The organization employs a variety of approaches to stimulate learning and improve performance, including human, technical and organizational aspects. Individuals and teams are highly competent and seek opportunities for improvement.	
Attributes	Behavioural indicators
Personal self–reflection: Systematically and effectively evaluates own performance and safety behaviour to identify areas for improvement.	• Reflects on own behaviour to identify any weaknesses, gaps or shortfalls in own performance; • Considers the impact personal behaviour has on others (both positive and negative); • Recognizes and talks about own shortcomings and areas for improvement; • Makes time for feedback: peer to peer feedback and post–job debriefs.
Learning from experience: Uses reflective practice to learn from experience, shares lessons learned in a timely manner.	• Reflects on experiences and results to extract key lessons and areas for improvements; • Actively seeks out feedback on performance from managers, peers

TABLE VII-4. SAFETY CULTURE TRAITS/CHARACTERISTICS

Safety culture trait/characteristic: Learning is highly valued. The organizational capacity to learn is well developed. The organization employs a variety of approaches to stimulate learning and improve performance, including human, technical and organizational aspects. Individuals and teams are highly competent and seek opportunities for improvement.	
Attributes	Behavioural indicators
	and direct reports; • Demonstrates a willingness to learn and develop by taking action on developmental feedback; • Learns from performance successes, identifying behaviour that contributed to successes and shortfalls or setbacks; • Identifies and acts on shortfalls in performance; • Takes ownership for own failures and avoids blaming others.
Training and development: Identifies and uses opportunities to learn, grow and develop and improve performance.	• Strives to learn and improve daily; • Actively participates and engages in individual, team and organizational learning opportunities; • Uses organizational learning tools to share lessons learnt and experiences; • Engages in and contributes actively to performance reviews and development discussions; • Takes actions to develop technical expertise and nuclear professionalism; • Actively seeks opportunities for self–improvement.

Fig. VII-1 identifies the core behaviours of a nuclear professional.

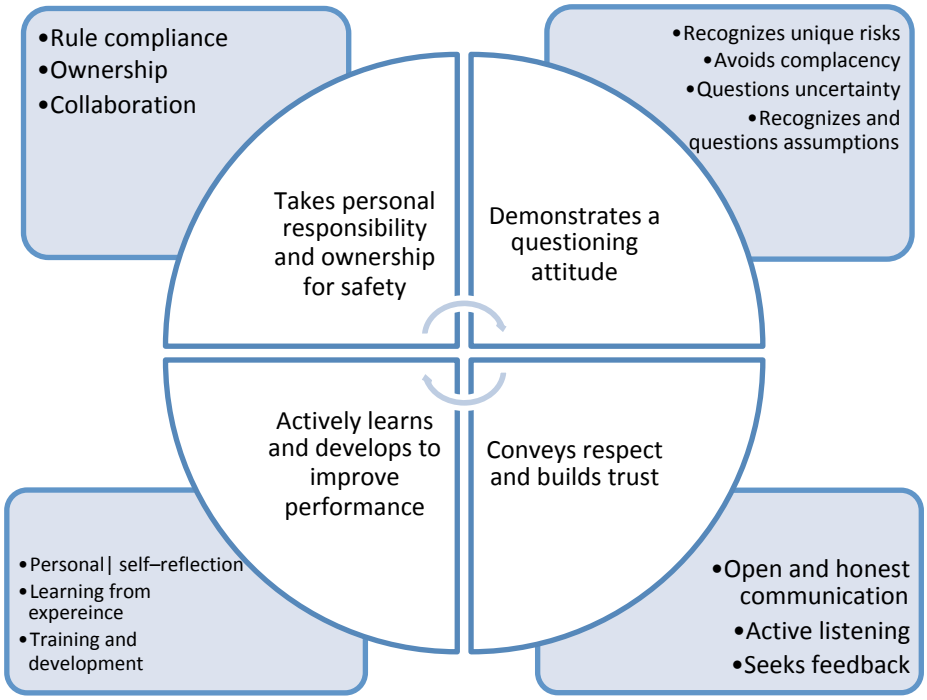

FIG. VII-1. Nuclear professional – core behaviours.

Table VII-5 summarizes the four safety culture traits/characteristics and associated safety attributes and personality characteristics mentioned above.

TABLE VII-5. SAFETY CULTURE TRAITS/CHARACTERISTICS

Safety traits/characteristics	Safety attributes	Personality characteristics
Takes personal responsibility and ownership for safety.	• Rule compliance; • Ownership; • Collaboration.	• Conscientious; • Self–discipline/control; • Vigilant and attentive.
Demonstrates a questioning attitude.	• Recognizes unique risks; • Avoids complacency; • Questions uncertainty. • Recognizes and questions assumptions.	• Questioning; • Cautious and deliberate; • Assertive communication.
Trust based communication and respect.	• Open and honest communication; • Active listening; • Seeks feedback.	• Open and honest/trustworthy; • Communicates effectively with others; • Cooperative/helpful.
Actively learns and develops to improve performance.	• Personal/self–reflection; • Learning from experience; • Training and development.	• Open–mindedness; • Willingness to learn; • Learning agility.

ANNEX VIII.
SELF–ASSESSMENT: EXISTING ASSESSMENT PRACTICES, METHODS AND TOOLS

Annex VIII is a self–assessment that organizations can use assess existing assessment practices and tools to identify strengths of the current approach and potential areas for improvement.

VIII-1. PART A. GENERAL SELECTION PROCESS, TOOLS AND METHODS

— Existing recruitment and selection processes, including legal and quality assurance aspects.

1. What type of personnel do you employ (categories, job families, roles)?
2. What are the regulatory requirements for the selection of staff that you employ (e.g. legislative requirements, professional bodies)?
3. Do you tailor your selection process to specific categories of staff? If yes, how?
4. How do you define the competency (skills, knowledge, attributes) requirements for roles?
5. Who defines the competency requirements?
6. How do you determine whether applicants/candidates have the capabilities to meet the essential performance (technical and behavioural) requirements of the job?
7. How do you ensure that selection decisions are based on objective assessment data and information?
8. What process do you follow to identify and select employees for different categories of staff and what assessment methods/tools do you use?

Role *Specify safety–critical roles*	Selection process *Describe the steps in your selection process*	Selection instruments *What tools/methods do you use?*	List the psychometric tests you use
Licensed staff		Standardized interview ☐ Psychometric tests ☐ Behavioural simulations ☐ Reference checks ☐ Security vetting ☐	
Security personnel		Standardized interview ☐ Psychometric tests ☐ Behavioural simulations ☐ Reference checks ☐	

Role *Specify safety–critical roles*	Selection process *Describe the steps in your selection process*	Selection instruments *What tools/methods do you use?*	List the psychometric tests you use
		Security vetting ☐	
Emergency responders		Standardized interview ☐ Psychometric tests ☐ Behavioural simulations ☐ Reference checks ☐ Security vetting ☐	
Management leadership		Standardized interview ☐ Psychometric tests ☐ Behavioural simulations ☐ Reference checks ☐ Security vetting ☐	

9. What process do you follow to identify and select employees for safety critical roles and what assessment methods/tools do you use?

Safety critical role *Specify safety–critical roles*	Selection process *Describe the steps in your selection process*	Selection instruments *What tools/methods do you use?*	List the psychometric tests you use
Licensed nuclear reactor operator		Standardized interview ☐ Psychometric tests ☐ Behavioural simulations ☐ Reference checks ☐ Security vetting ☐	
Security personnel		Standardized interview ☐ Psychometric tests ☐ Behavioural simulations ☐ Reference checks ☐ Security vetting ☐	

Safety critical role *Specify safety–critical roles*	Selection process *Describe the steps in your selection process*	Selection instruments *What tools/methods do you use?*	List the psychometric tests you use
Emergency responders		Standardized interview ☐ Psychometric tests ☐ Behavioural simulations ☐ Reference checks ☐ Security vetting ☐	
Management leadership		Standardized interview ☐ Psychometric tests ☐ Behavioural simulations ☐ Reference checks ☐ Security vetting ☐	

10. Who makes the hiring decisions? How do you ensure that they are equipped to make effective selection/hiring decisions?
11. How do you evaluate the selection process and the effectiveness of the selection instruments used?
12. Who is accountable for the effectiveness of the selection process in your organization?
13. What do you consider the strengths, weaknesses, risks/threats and improvement opportunities of your selection process?

SWOT analysis of selection process	
Strengths (what we do well; this improves the quality of our selection decision)	Weaknesses (we can do this better to improve the quality of our selection decisions)
Opportunities (improvement opportunities that we can target to strengthen the rigour of our process)	Threats/risks (the gaps in our process that pose threats/risks to safety, security and performance)

VIII-2. PART B: ASSESSMENT PRACTICES

— Tools, methods and instruments, their application, content and scientific models.

14. What assessment tools/methods do you use in each stage of the employee life cycle?

Stage of the employee life cycle	What is to be measured/assessed	What assessment tool/method/instrument is being used?	What are the reasons for your choice of assessment tool/instrument?
Selection			
Performance evaluation			
Training (requalification\ recertification)			
Career progression/promotion			
Exit/off–boarding			

15. Which assessment tools do you use most frequently? Why?

Assessment tools used most frequently	Reasons why?

16. What criteria do you use to select assessment tools/instruments?
17. How do you evaluate the validity and reliability of the assessment tools used?
18. How do you address diversity (culture, language, nationality) in your assessment methodology?
19. What assessment methods/tools/instruments do you use to evaluate whether applicants have the personality traits or attributes to perform successfully in your environment?
20. What assessment methods/tools do you use to determine if there is a suitable fit between the person and the organizational culture or work environment?
21. How do you get from assessment results to a hiring decision?
22. What do you consider the strengths, weaknesses, risks/threats and improvement opportunities of your assessment practices?

SWOT analysis of assessment practices	
Strengths (what you do well; can be considered as a 'good' or 'best practice')	Weaknesses (areas to be improved))
Opportunities (potential improvement opportunities)	Threats (potential problems/risks)

23. What challenges do you experience in the assessment of employees at each stage of the employee life cycle?

Employee life cycle stage	Challenges experienced	Questions I have about each stage
Selection		
Performance evaluation		
Training (requalification\ recertification)		
Career progression| promotion		
Exit/off–boarding		

DEFINITIONS OF TERMS

assessment - An assessment is a measure or appraisal of personal characteristics, attributes or behaviour through several techniques, including tests, interviews, personality questionnaires and other similar instruments.

assessment centre - An assessment centre is an assessment technology that involves several individuals undertaking multiple assessments while being observed by a team of trained assessors who evaluate performance against a set of pre–determined, job related assessment criteria.

assessment criteria - Those attributes or characteristics which the assessment is designed to assess. These may be referred to as competencies or dimensions.

assessment method -Assessment activities typically include, exercises standardized tests, structured interviews and simulations. Any tool, method or activity to allow an assessment or evaluation of individuals or groups.

assessment practitioners - Assessment practitioners include psychologists, psychometrics, certified test administrators and any individual involved in the use or acquisition of assessment instruments.

behavioural assessment - Behavioural assessments are assessments techniques that are used to assess behaviour and includes observation, psychological tests and interviews.

behavioural competencies - Any behavioural attribute which contributes to an individual's successful performance. This includes knowledge, skills sets and personality characteristics that influence how a task is performed and how the required performance standards are achieved. Behavioural competencies typically include interpersonal behaviour, information processing and decision making.

competence - The ability to apply the skills, knowledge and attributes to cope with the job demands and perform the tasks/activities within a function or an occupational area to the required standard or level of performance.

competency - A group of related knowledge, skills and attributes needed to perform a specific job.

competency based assessment - An assessment methodology that draws largely from assessment centre technology. It measures skills and abilities relating to the performance requirements of a particular job. These assessments provide a standardized set of activities that enable a prediction of behaviour relevant to work in a particular context.

competency profile - The competency required by the holder of an individual post in order to satisfactorily carry out the duties of the post.

construct - A construct is an ability or skill or attribute that an assessment aims to measure.

contextualisation - Assessment practices need to take into account the context within which it is applied, that is the local circumstances that may inform and guide the determination of appropriate practices.

core competencies - Capabilities that are specific to an organization and relevant to operational and strategic requirements, for example radiation protection management, nuclear fuel management, procedure use and adherence.

data protection - Policy, practices and procedures adopted to ensure that personal data is held securely and not made available other than to authorized persons.

event root cause analysis - Event root cause analysis is a problem–solving method which is used to pinpoint the exact root cause of a problem or event. The root cause is the actual cause of a specific

problem or set of problems, and when that cause is removed, it prevents the final undesirable effect from occurring.

exercise - A task or activity which replicates or simulates the tasks that an individual performs within a job role.

fairness - Assessments are fair when they are made based on objective evidence and are free from intended or unintended biases that affect the accuracy of conclusions for some participants.

graded approach - The approach by which the level of analysis, documentation and actions necessary comply with a requirement are commensurate with the relative importance of safety, safeguards and security; the magnitude of any hazard involved; the life cycle stage of a facility; the programmed mission of a facility; the particular characteristics of a facility; any other relevant factors.

This approach is used to ensure that resources are apportioned in a manner that results in the highest safety (or other targeted) benefit. The grading or proportioning is based upon considerations related to relative hazards and risks. The process of proportioning is termed the Graded Approach.

high engagement - Employee engagement is the emotional commitment the employee has to the organization and its goals. This emotional commitment means engaged employees care about their work and their company and are motivated to contribute to organizational success, with an enhanced sense of their own well–being.

high performance competencies - High performance competencies are those that distinguish average performers from high performers.

informed consent - Decision to take part in a process or event based on sufficient prior information being provided regarding the detail of the event, conditions for taking part and the consequences of consent.

integrated HP event analysis - The integration of all information in order to analyse a human performance event and determine all the contributory factors and root cause analysis.

job analysis - A systematic process using verified job analysis tools to identify in detail the tasks, duties and responsibilities associated with particular jobs. The output of a job analysis is a comprehensive list of the responsibilities and the high-level tasks or activities that need to be performed in order to fulfil each of the key responsibilities.

key driver - A factor that influences, shapes or "drives" the outcome of the activity.

lockout–tagout - When performing maintenance or testing on equipment that is live or contains some sort of energy, the equipment is locked and then tagged to signify that it is isolated for maintenance.

management and leadership competencies - Management and leadership competencies are those specific attributes and capabilities that are important to management and leadership effectiveness. Examples of typical competencies: planning and organizing, delegation and control, coaching and developing others, influence and impact, motivating and inspiring others.

observer - Another term used for an assessor often used in centres for development, where the emphasis of the role may be less about assessment and more about development.

off–boarding - This refers to the exit process that takes place from the point of notification of an employee's intention to leave the organization to the last day of employment and termination of contractual employment.

personal data - Any information that is identifiably related to a person.

psychological assessment - More than a psychological test and may include psychological tests, interview information, medical evaluation, observational data, personal history and clinical interview. It includes procedures used to assess, abilities, attributes, preferences, performance or potential.

psychometric tests - A subset of psychological tests. It involves the measurement of some aspect of an individual's behaviour, preferences or performance. It is defined as a 'standardised sample of behaviour which can be described by a numerical scale or category system' (Cronbach, 1984). It is designed to be administered under carefully controlled or standardized conditions that involve systematic scoring protocols. It also includes procedures that may result in the qualitative classification or ordering of people (e.g. in terms of type). Psychometric tests are categorized into two main groups: ability and personality.

reliability - Refers to the extent to which an assessment yields the same or similar results if the same test is taken on different occasions by an individual or group with equal ability under the same testing conditions.

set to work - This refers to the activities that take place before an employee performs an assigned task or activity and includes the communication of work instructions and any information that will equip the individual to perform the task in a safe, secure and effective manner.

significant event - An event is an incident that has safety significance. A significant event is an incident that has high safety consequences to people, the environment or facilities.

stakeholders - Individuals or groups that are impacted by the use or the effects of an assessment process, e.g. managers, employees, trade unions, test–users, and test administrators.

systematic - Refer to a process or procedure being carried out in a methodical manner.

systemic - System–wide – affecting or relating to a group or system (such as an organization) instead of its individual members or parts.

task analysis - Used to decompose tasks or activities into subtasks and is typically used to analyse more complex roles and associated activities. Tasks need to be decomposed to a level that enables the identification and development of competency requirements, i.e. the skills, knowledge and attributes needed to perform the task/activity. The output of a task analysis is a detailed competency-based job profile.

technical competencies - Functional or job specific competency requirements that are specific to the discipline area or field of expertise. They are often technical or operational in nature, e.g. maintenance, quality assurance, and inspection and testing.

three–way communication - In three–way communication, the sender first orally states his or her message to the receiver clearly and concisely. Next, the receiver acknowledges the communication by repeating the message to the sender. The receiver must repeat back or restate any critical information exactly as it was stated by the sender. If the receiver does not understand the sender's message, he or she must ask for clarification. Finally, the sender acknowledges the receiver's reply and verbally confirms to the receiver that the message is correct and properly understood.

threshold competencies - Basic or minimum competency requirements needed to get the job done, but which are not associated with superior performance.

underpinning knowledge - The underlying knowledge related to specific occupational areas which relates to an understanding of why certain activities have to be carried out in a particular manner.

validity - Validity refers to how accurately a measurement corresponds to what is being tested and is defined as the extent to which an assessment accurately measures what it is intended to measure

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