

Guidelines for Training Needs Self-Assessment for the Regulatory Body

DRAFT

Objectives of the Guidelines

The objective of these guidelines is to provide information on specific and practical means to support the implementation of the IAEA safety standards in the area of ensuring regulatory competence. It is expected that these guidelines will also support the implementation of chapter 8 of the Nuclear Safety Convention and Module III of the IRRS.

Scope

These guidelines provide a systematic approach and step based procedure for analyzing the training needs of regulatory bodies. They also provide examples of a questionnaire for self assessment based on IAEA-TECDOC 1254.

The methodology and process described in these guidelines are based on both the IAEA safety standards and on the regulatory functions and therefore applicable to any regulator. However, the appendices and examples need to be examined in the context of the particular regulatory organization and its areas of competence within the national infrastructure.

Introduction

These Guidelines for Training Needs Assessment (TNA) give guidance for analysis of required competencies and associated training needs for the regulatory body. A need assessment is essential to ensure competent human resources as required in the Convention on Nuclear Safety and the IAEA safety standards. This analysis will support Module III, part I of the IRRS guidelines.

IAEA has published a number of safety standards in which the need and importance of ensuring regulatory is emphasized. These documents include:

- IAEA GS-R-1, Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety
- IAEA GS-R-3, Management System for Facilities and Activities
- IAEA GS-G-3.1, Application of the Management System for Facilities and Activities
- IAEA GS-G-1.1, Organisation and Staffing of the Regulatory Body for Nuclear Facilities
- IAEA-TECDOC-1254, Training the staff of the regulatory body for nuclear facilities: A competency framework

GS-R-1 is one of the first of the IAEA Safety Requirements in the Safety Standards Series, and includes overall requirements (paragraphs 4.6 – 4.8) for staffing and training for the regulatory body.

GS-R-3 includes a section dealing with human resources. The requirement is that senior management shall determine (paragraph 4.1) “...the amount of resources necessary and shall provide the resources to carry out the activities of the organisation” and (paragraph 4.3) “...the competence requirements for individuals at all levels.”

GS-G-3.1 gives a great deal of guidance for organisations in relation to human resource management (paragraph 2.25) and on training (paragraph 4.4 et seq.). This will not be repeated here, but the main ideas are to:

- Manage the organisation’s knowledge for decision making, whether internally or externally sourced;
- Define the competence needs and ensure that the competencies are available;

- Plan and implement the necessary training to meet present and expected future competence needs, when internally sourced.

¹GS-G-1.1 provides guidance for training of the regulatory staff, including the training needs. It provides that, soon after recruitment, each member of the staff should be provided with a training plan, including, as appropriate, periodic retraining. The plan should specify the nature of the training needed, its timing and sequence and where it is to be obtained, and the levels of competence to be achieved. The basic elements of a regulatory training programme are also provided.

IAEA-TECDOC-1254 provides a detailed and systematic competency framework for regulatory bodies describing some sample tasks, and setting out the required competencies in a four-quadrant model.

Planning of future staffing needs

Proper management of recruitment and training requires a prior analysis of the future needs of the regulatory body, in terms of competencies, knowledge, skills, and attitudes. This must include a critical examination of the structure of the organisation, and consideration of whether it is suitable for its future tasks. This analysis should take into account expected staff turnover, restructuring and the need for hand-over arrangements. The result can then be used as the template for future recruitment and promotion.

In considering its future tasks and the best use of available resources, the regulatory body will need to examine critically those topics which it considers must be retained 'in-house' as core activities, and any which it might delegate to other authorities, or as candidate areas for self-regulation by the licensee, under suitable quality assurance arrangements. A broadly used approach is to outsource services to an external independent body that provides assistance as the Technical Support Organization (TSO) to the regulatory body. In these cases, the regulatory body must provide for an adequate number of staff qualified to specify, monitor and evaluate the work of the TSO.

As part of the planning process, the regulatory body needs to consider whether particular skills shortages could be better met through the use of external resources, such as **Technical Support Organizations (TSOs)** or consultants, rather than by recruitment and training of internal staff.

Recruitment and selection

Most regulatory bodies have a policy for recruitment and selection, whether written or tacit. The age and experience levels of potential staff vary, but most jobs would require a qualification in some relevant technical specialities. IAEA-TECDOC-1254, Paragraph 3.4, lists typical specialities.

The IAEA documents listed in the Introduction do not make any particular recommendations on matters such as entrance qualifications and prior experience of recruits to the regulatory body. Each **Member State (MS)** may determine its policy based on national circumstances, such as the salary levels and training resources needed to attract and retain high quality staff. There should be a systematic recruitment process, which may include, for example, recruitment at universities and technical institutes, through technical societies and their publications, general advertisement of openings and other suitable means. Evaluation of applicants may include aptitude tests, personality

¹ Competencies are groups of related knowledge, skills and attitudes (KSAs) needed to perform a particular job. Competencies are the mental, physical and behavioural tools needed for an activity or a task.

tests, and assessment of the applicant's particular skills relative to those that are required for each vacancy.

Regardless of the source of new staff members, some training will be needed to introduce them to the organization and prepare them to assume their role in the organization. In addition, a continuing program of training for personnel at all levels in the organization is needed to maintain and ensure continuous improvement of their competencies.

Training Needs Assessment (TNA) for Regulatory Bodies

It is essential that the regulatory body apply a systematic approach to identify current and desired competencies, determine the gaps, and design and implement training programmes to address the desired competencies

Training Needs Assessment may require extensive manpower in terms of resources and time. It can be used either to expand or refocus an existing training programme or to build a new training programme.

In order to conduct a TNA, one must start with the mission and functions of the organisation. This information should be documented as required in GS-R-3, "Management System for Facilities and Activities," Chapter 2.8 of which states:

"The documentation of the management system shall include the following:

- *The policy statements of the organization*
- *A description of the structure of the organization*
- *A description of the functional responsibilities, accountabilities, levels of authority and interactions of those managing, performing and assessing work*
- *A description of the processes and supporting information that explain how work is to be prepared, reviewed, carried out, recorded, assessed and improved."*

Every person in the regulatory body should understand the functions and the management system of the organization.

Also in GS-R-1 and GS-G-1.1 the regulatory functions are identified as follows:

Major functions of the regulatory body

- Authorization
- Review and assessment
- Inspection and enforcement
- Development of regulations and guides

Supplementary functions

- Research and development
- Emergency preparedness
- International co-operation

The regulatory body will normally be organised into a number of units. (In this document, 'unit' is intended to mean an organizational unit at any level.) Depending on the unit, it may focus on one or more of these regulatory functions. The unit's function leads to the associated tasks that are required to fulfil its responsibilities. Each task requires a certain competency in terms of **knowledge, skills, and attitudes (KSAs)**. In Tables IV and V, TECDOC-1254 (reproduced in Appendix I of this document) identifies the specific competencies needed for each of the regulatory functions in a 'quadrant' model. This document provides a self-assessment questionnaire that will help the unit's

management to identify gaps in available competencies and the related KSAs, which can be corrected by recruitment, training, or outsourcing.

Process for Training Needs Assessment

The regulatory body management must determine what competencies and knowledge, skills and attitudes (KSAs) are required for each of the staff positions. IAEA-TECDOC-1254 provides guidance for planning the training of the various types of staff required by the regulatory body. TECDOC-1254 organises the competencies in a ‘quadrant’ structure as shown below, along with some typical examples.

Table 1. Quadrant Model of Competencies

<p>4. Personal and interpersonal effectiveness competencies</p> <ul style="list-style-type: none"> • Analytical thinking, problem solving and decision making • Personal effectiveness • Communication • Team work • Management 	<p>1. Legal basis and regulatory processes competencies</p> <ul style="list-style-type: none"> • Legal basis • Regulatory processes • Regulatory guidance documents • Licence and licensing documents • Enforcement process
<p>3. Regulatory practices competencies</p> <ul style="list-style-type: none"> • Safety focused analytical techniques • Inspection techniques • Auditing techniques • Investigation techniques 	<p>2. Technical disciplines competencies</p> <ul style="list-style-type: none"> • Basic technology • Applied technology • Specialized technology

Analysis of the required competencies and those available in the organization is a management responsibility. A **Training Coordinator (TC)** should be appointed, who will co-ordinate the process of comparing available competencies with needed competencies to identify competency “gaps” in staff knowledge, skills, and attitudes (KSA). Based on information developed in cooperation with the organization’s management, the TC will quantify the number of people associated with each gap and develop a chart of the staff needs. Then, the organization’s management prioritizes the gaps and allocates resources to recruitment, training, and outsourcing to fill as many gaps as possible with the available resources. The gap analysis can be repeated periodically to determine by how much the gaps have been reduced. This evaluation will facilitate design of the next training cycle.

TNA Guidelines/Procedure

These TNA Guidelines provide a step-by-step approach.

Preparatory actions

1. The **Training Coordinator (TC)** should:

- Plan the TNA;
- Brief management and staff on how to conduct the TNA;
- Organize and supervise the implementation of each step of the Gap Analysis;
- Use the results to quantify the numbers of staff corresponding to each gap;

- Consider how to fill the gaps by recruitment, training, and outsourcing;
- Report the results of the analysis and recommend means to fill the gaps to the regulatory body's management;
- For those gaps to be filled by training, develop a training programme in consultation with other staff and management;
- Supervise implementation of the training programme;
- Evaluate the training results;
- Suggest future training actions or alternative measures to ensure regulatory competence in the short, medium, and long term.

2. The TC should study these Guidelines and TECDOC 1254 and become thoroughly familiar with the training needs assessment procedure.

3. The TC should conduct a meeting to brief the managers and staff on the training needs analysis procedure, explaining in particular the meaning of the questionnaire and how to use it.

4. With guidance from the TC, each unit of the regulatory body should conduct a self-assessment of its needs, taking into account the description of the **functions** of that unit.

Figure 1 depicts the process for TNA.

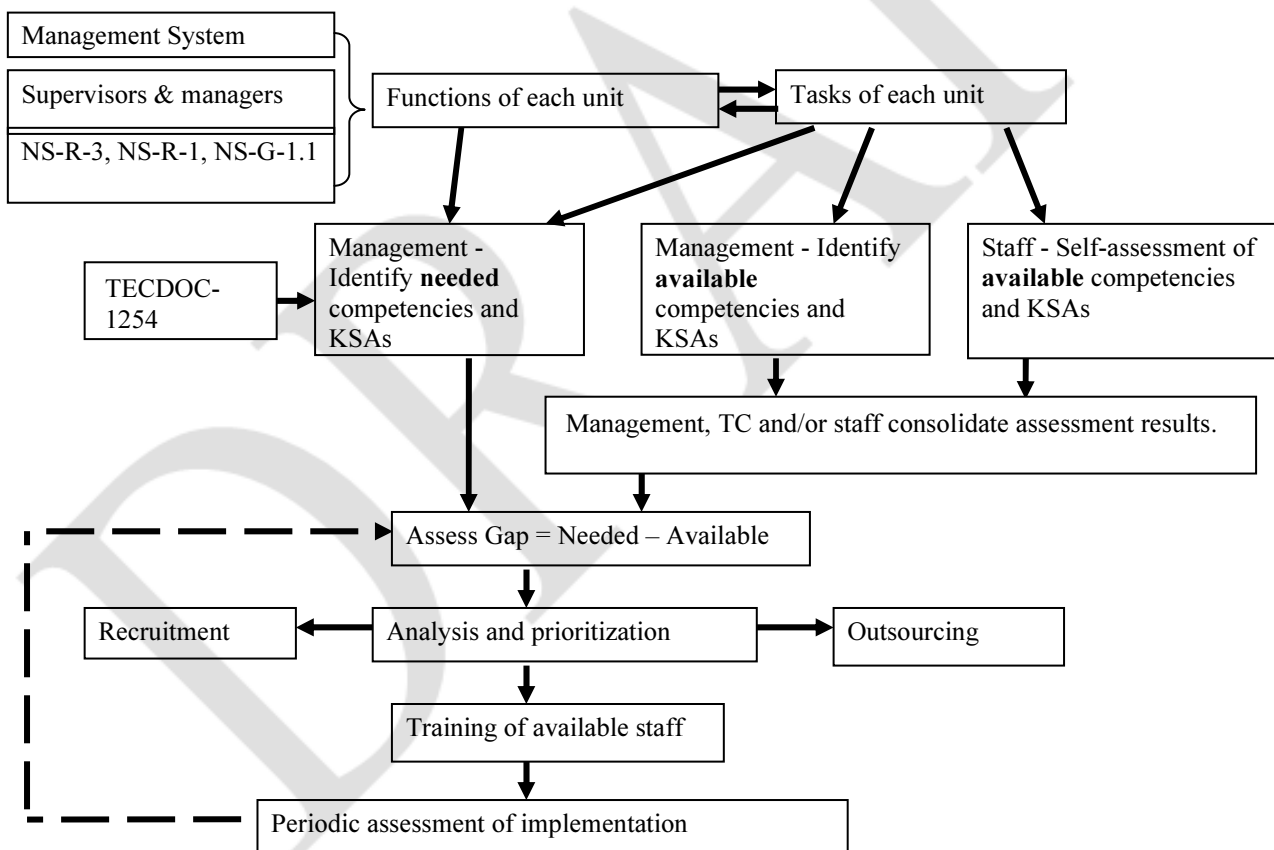


Figure 1. The TNA process

Gap Analysis

The gap analysis has four steps, as follows:

Step 1: Determine the Regulatory Function of Each Unit and the Required Competencies

The organizational mandate should take account of the present needs as well as the future aspirations of the organization. The list of units should be presented with corresponding functions even if the unit does not yet exist. All anticipated needs should be accounted for in development of the training programme;

The information about the functions of each unit should be available in the Management System documentation. Table 1 of this document and Appendix II provide a general compilation of competencies from TECDOC-1254 based on the regulatory functions, which can help identify what is needed for step 2.

Identify needed competencies relevant to the unit. Tables IV and V of TECDOC 1254 (reproduced in Appendix I of this document) provide a suggested correlation of regulatory functions and competencies that are applicable to each of the functions. **These Tables may be used to guide identification of the competencies important to a unit depending on the focus of the regulatory function the unit is fulfilling.**

Step 2: Determine Tasks Corresponding to the Regulatory Functions

Describe the tasks that will be needed to perform the defined regulatory functions for each unit. Table 1 and Table II of TECDOC 1254 provide sample tasks for the main and secondary regulatory functions.

Step 3: Determine the KSA Levels Needed to Perform the Regulatory Functions

For each unit, the supervisor/manager of the unit should specify for each position the level (low, medium, high) of required KSAs. This is a time-consuming task that may be effectively done by a team. TECDOC 1254 provides a compilation of suggested KSAs associated with each competency identified in each of the four quadrants (see Table 1). The TECDOC compilation was incorporated in Appendix II of this guideline, which gives an example of questionnaire that can be used for determining the levels of KSAs needed to perform the regulatory functions. It also suggests definitions of “high”, “medium” and “low” for each competency. **The compilation in Appendix II should be adapted to the particular situation of the regulatory body, and adjusted taking into account Appendix I as explained in Step 1.**

Step 4: Conduct the Self-assessment of the Existing Competencies

For each identified KSA the staff member of the unit should assess his/her existing level (H, M, L), without knowing the required levels, to avoid bias. To facilitate the execution of Steps 2 and 3, questionnaires applicable for regulatory bodies are given in Appendix II. At the end of this process we will have data on all the required KSAs and available KSAs, and we can proceed to assessing the gaps.

An EXCEL version of the questionnaire is also available to gather the data for the gap analysis, summarize the results and compile the results into charts for the organizational unit and higher levels in the organization. Figure 2 shows an example of the gap chart for each of the four quadrants.

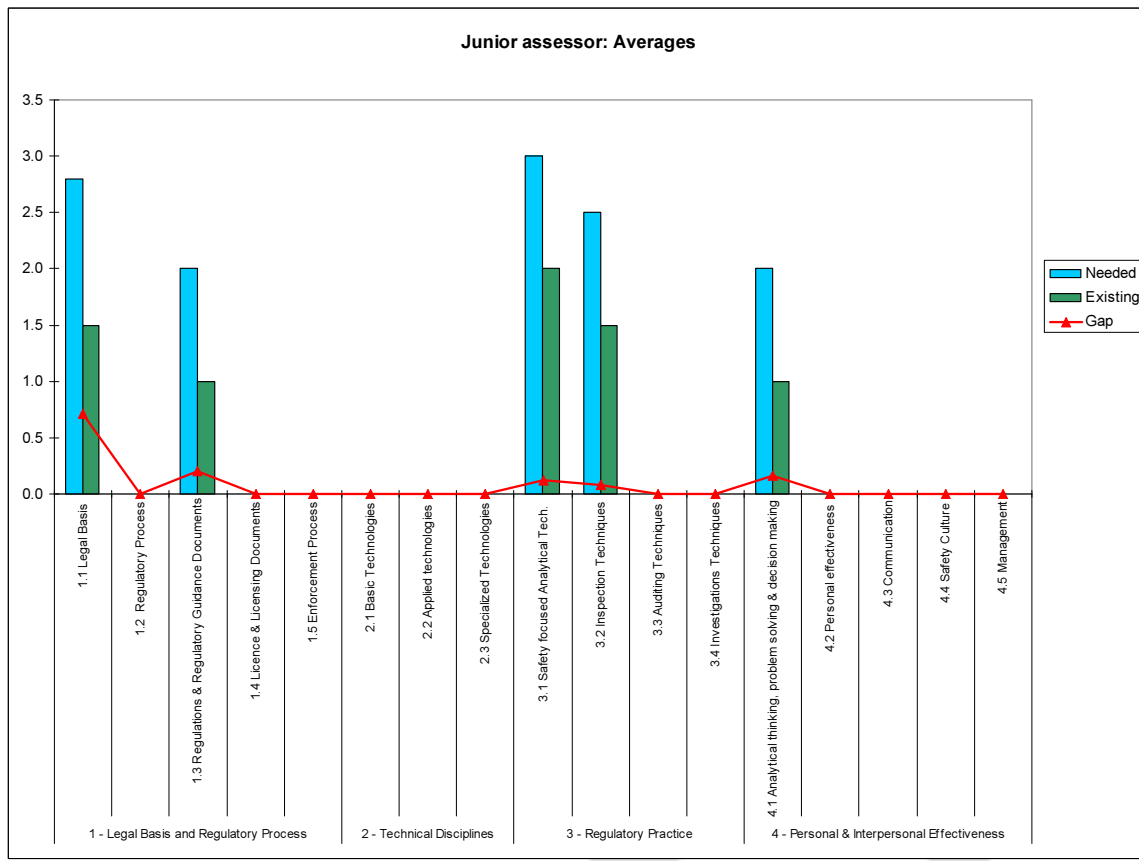


Figure 2. Chart of gap analysis results

Step 5: Determine the Training Gaps

The TC and managers will analyze the gaps for each unit, determining how many people correspond to each gap. They will do this for each unit, and then produce a map of gaps for the whole organization.

Step 6: Prioritize the Gaps and Allocate Resources to Fill the Gaps

Management and the TC should prioritize the gaps according to their importance to the regulatory functions and allocate resources to fill some of the gaps by recruitment, training, and outsourcing, as shown in Figure 1. In many cases the gap can be filled through outsourcing to a **Technical Support Organization (TSO)** or engineering company. In such cases it is important that within the regulatory staff there is at least one senior expert well-trained in the subject matter to serve as an “intelligent customer”.

Step 7: Repeat the TNA Process as Necessary

Circumstances, such as reorganization, assignment of new regulatory functions, recruitment of new staff, etc., may make it necessary to repeat the TNA process either for the whole organization or for affected parts. In addition, it is advisable to conduct a new TNA periodically to assess the effectiveness of the training programme, design new training cycles and foster continuous improvement.

Summary

These Guidelines for Training Needs Assessment (TNA) give guidance for analysis of required competencies and associated training needs, for the regulatory body. The regulatory body appoints a Training Coordinator (TC) to analyze training needs and develop a training programme. The TC, management and support staff list the functions and tasks of each unit, and then determine what competencies and associated knowledge, skills, and attitudes are required for those tasks, as illustrated in Figure 1. A self-assessment determines what competencies are already available in the regulatory staff. The TC compares the available and required competencies to identify the number of people associated with each competency “gap”. Then the regulatory body prioritizes the gaps and allocates resources to recruitment, training, and outsourcing to fill as many of the gaps as possible. The TC devises a training programme, which may include classroom training, on-the-job training, distance learning, and structured self-study. Based on periodic evaluation of the on-going training programmes and assessment of new and/or remaining gaps identified using the proposed TNA process, future training cycles should be planned for continuous improvement.

References

IAEA Safety Requirements GS-R-1, Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety

IAEA Safety Requirements GS-R-3, Management System for Facilities and Activities

IAEA Safety Guide GS-G-3.1, Application of the Management System for Facilities and Activities

IAEA Safety Guide GS-G-1.1, Organisation and Staffing of the Regulatory Body for Nuclear Facilities

IAEA-TECDOC-1254, Training and staff of the regulatory body for nuclear facilities: A competency framework

Appendix I

Tables AI.1 and AI.2 of this Appendix (reproduced from TECDOC-1254, Tables IV and V) provide a correlation of the competencies required to fulfil the main regulatory functions and the supplementary regulatory functions, respectively. For each regulatory function, the required competencies are indicated by an 'x' in the appropriate box. This information may be used to identify the relevant competencies and KSAs in Appendix II given the regulatory function of the unit under consideration.

Table AI.1. Comparison of Specific Competencies Needed in Main Regulatory Functional Areas

Functions / Competencies	Authorization	Review & Assessment	Inspection & Enforcement	Development of Reg. Guides
Q1: Legal Basis and Regulatory Process				
1.1. Legal Basis	x		x	x
1.2. Regulatory Process	x	x	x	x
1.3. Regulations and Regulatory Guidance Documents	x	x	x	x
1.4. License and Licensing Documents	x	x	x	x
1.5. Enforcement Process	x		x	
Q2: Technical Disciplines				
2.1. Basic Technologies	x	x	x	x
2.2. Applied Technologies		x	x	
2.3. Specialized Technologies		x		
Q3: Regulatory Practice				
3.1. Safety focused Analytical Tech.	x	x	x	x
3.2. Inspection Techniques			x	
3.3. Auditing Techniques			x	
3.4. Investigation Techniques			x	
Q4. Personal and Interpersonal Effectiveness				
4.1. Analytical thinking, problem solving and decision making	x	x	x	
4.2. Personal effectiveness	x	x	x	x
4.3. Communication	x		x	x
4.4. Team work	x	x	x	x
4.5. Management	x			

Table AI.2 Comparison of Specific Competencies Needed in Regulatory Supplementary Functional Areas

Supplementary Functions / Competencies	Research & Development	Emergency Preparedness	International Co-operation*
Q1: Legal Basis and Regulatory Process			
1.1. Legal Basis		x	x
1.2. Regulatory Process			x
1.3. Regulations and Regulatory Guidance Documents		x	x
1.4. License and Licensing Documents		x	x
1.5. Enforcement Process			
Q2: Technical Disciplines			
2.1. Basic Technologies	x	x	x
2.2. Applied Technologies	x	x	x
2.3. Specialized Technologies			
Q3: Regulatory Practice			
3.1. Safety focused Analytical Techniques.	x		x
3.2. Inspection Techniques			x
3.3. Auditing Techniques			x
3.4. Investigation Techniques			x
Q4. Personal and Interpersonal Effectiveness			
4.1. Analytical thinking, problem solving and decision making	x	x	x
4.2. Personal effectiveness	x	x	x
4.3. Communication		x	x
4.4. Team work	x	x	x
4.5. Management			x

* This function includes international safeguards commitments

Appendix II

Questionnaire for Developing Competency Profiles for Regulatory Bodies

Objective of this questionnaire

This questionnaire will help determine competency gaps for Regulatory Bodies. The information will then be used in formulating training programmes and strategies to develop competent human resources.

To complete this questionnaire for a given position, please read the definitions of the relevant competencies as indicated in Table 1, above, and the criteria for rating of the existing and required KSAs for each competency. Then, fill the right-most two columns of the matrix, indicating Needed Competency Level and Existing Competency Level by entering L for Low, M for Medium, H for High or NA for Not Applicable in the respective cells.

In general:

- Low means basic understanding of the subject;
- Medium means understanding of the subject matter and capability to apply the knowledge;
- High means an understanding of the subject matter at an expert level and capability to supervise people in applying the knowledge.

More detailed definition is given with each competency.

Competencies: Competencies are groups of related knowledge, skills and attitudes (KSAs) needed to perform a particular job. Competencies are the mental, physical and behavioural tools needed for an activity or a task.

An EXCEL format of this questionnaire is available facilitating the assessment of the gaps.

Quadrant 1: Competencies Related to Legal Basis and Regulatory Processes

1.1. Legal Basis Competency: This competency is the ability to comprehend, interpret and use relevant documents that establish the legal requirements for obtaining a license, and the powers of the regulatory staff and the limits to these powers.

Low: Basic knowledge of national nuclear and non-nuclear legislation relevant/applicable to nuclear regulation (e.g.: acts, decrees regulations in nuclear/industrial safety, environmental regulations, applicable international commitments, etc.);

Medium: Full understanding of the basic relationship between the relevant/applicable legal requirements and one's own regulatory duties and those of subordinates;

High: In-depth knowledge and ability or work experience to factor in complex relevant legal considerations while performing own regulatory duties or supervising others in their duties.

COMPETENCY	KSAs	Needed KSA Level (L, M, H, or NA)	Existing KSA Level (L, M, H, or NA)
Legal Basis	1.1.1 Comprehension of the central government's nuclear laws and decrees as well as other laws and decrees that apply to a licensed nuclear facility		
	1.1.2 Comprehension of the applicability to the nuclear industry of the laws and decrees of the local jurisdictions and authorities		
	1.1.3 Comprehension and use of the regulatory body's regulations within limits as per interpretations offered by legal counsels and recorded experience		
	1.1.4 Comprehension of the rights of all stakeholders affected directly or indirectly by the provisions of the legal basis of the regulatory body		
	1.1.5 Ability to interpret legal texts for application in the field		
	1.1.6 Ability to relate legal requirements to routine tasks		

	1.1.7	Comprehension of the interrelationship between legal documents, regulatory guidance documents and licensing documents		
<p>1.2. Regulatory Process Competency: This competency is the performance of work in accordance with rules, regulations, and established regulatory protocol to achieve the relevant regulatory objectives.</p> <p>Low: Basic knowledge of the mandate, mission and objectives of the regulatory body; basic knowledge of policies, procedures, guidance documents and licensing documents; basic knowledge of regulatory processes (authorization, inspection and enforcement, development of regulations and guides, review and assessment). If a management system is in place, basic knowledge of the management system.</p> <p>Medium: Thorough understanding and ability to relate policies, procedures, guidance documents and licensing documents to duties within the regulatory body. If a management system is in place, a full understanding of the system and its application to one's own work.</p> <p>High: In-depth knowledge and ability in applying the regulatory body's policies, procedures, guidance documents and licensing documents in complex situations and in providing guidance to subordinates in their application. If a management system is in place, comprehensive understanding of the system and its application to own work and that of subordinates.</p>				
Regulatory Process	1.2.1	Comprehension of the mandate, mission and objectives of the organisation		
	1.2.2	Comprehension of measures for implementing actions to achieve the regulatory short-term and long-term strategic objectives and goals of the regulatory body		
	1.2.3	Comprehension of the relevant policies, procedures, guidance documents and licensing documents that are used in carrying out specific regulatory tasks as defined in the legal basis		
	1.2.4	Comprehension of duties to process an application rigorously and in a timely manner		
	1.2.5	Adherence to the principles of good regulations, so that the regulatory body carries out its activities in independent, open efficient, clear, reliable and fair manner		
	1.2.6	Comprehension of the necessity of involving all stakeholders, particularly the licensees, in the licensing process and in the regulatory practice of the regulatory body		

	1.2.7 Ability to assimilate information and data gathered from several sources and to give written recommendations to the regulatory body management		
<p>1.3. Regulatory Guidance Documents Competency: This competency is the capacity to produce regulations and guidance documents, including policies and procedures, containing practical steps on how regulatory requirements could be satisfied by the licensees and be adjudicated by the regulatory staff.</p> <p>Low: Basic knowledge of the regulations and guidance documents with the ability to interpret, apply and revise existing documents within a specific area of expertise.</p> <p>Medium: Ability to draft new regulations and guidance documents for satisfying regulatory requirements and guiding regulatory adjudications, keeping in mind responsibilities and commitments of all stakeholders.</p> <p>High: ability and practical experience in producing regulations and guidance documents; ability to monitor and guide their practical use in the relevant regulatory processes, taking into account legal implications. Awareness and knowledge of safety requirements applied in other countries in addition to national regulatory requirements.</p>			
Regulatory Guidance Documents	1.3.1 Comprehension of the requirements and implications of international and national standards		
	1.3.2 Comprehension of the safety requirements applied in other countries		
	1.3.3 Comprehension of the safety objectives and criteria, as related to the facilities or devices being considered for licensing		
	1.3.4 Ability to define the format and contents of requirements for a license application		
	1.3.5 Ability to define technical safety requirements for siting, design, construction, commissioning, operation, decommissioning and waste management of nuclear facilities or devices		
	1.3.6 Ability to identify gaps and confirm needs for the production of new regulations and regulatory guidance documents, or modifications to existing regulatory documents		
	1.3.7 Proficiency in writing regulatory requirements in mandatory rules and regulations as well as in regulatory guidance documents		

	1.3.8	Ability to transfer legal requirements into forms that can easily become understandable and into practical guidance texts		
	1.3.9	Ability to produce regulations and regulatory guidance documents in accordance with established formats and formal textual styles		
	1.3.10	Ability to ensure consistency in terminology and format in regulatory documents		
<p>1.4. License and Licensing Documents Competency: This competency is the capacity to ensure that the license and the associated licensing documents are in compliance in form and contents with the regulatory requirements.</p> <p>Low: Basic understanding of the format and content of a license and licensing conditions for a nuclear facility.</p> <p>Medium: Thorough knowledge of the format and content of a license and associated license conditions sufficient to synthesize various licensing condition recommendations into the licensing documents.</p> <p>High: Comprehensive awareness, appreciation and comprehension of the format and content of a license and license conditions and the capability to make licensing decisions and to reflect those decisions in the licensing documents.</p>				
License & Licensing Documents	1.4.1	Comprehension of the format and contents of a license produced for a nuclear facility or a device		
	1.4.2	Comprehension of the possible options of a license		
	1.4.3	Ability to take the licensing recommendations into consideration and include them in the body of the license or in the accompanying license conditions		
	1.4.4	Comprehension of how the terms of a license and the associated license conditions could be transferred into a licensee's operating safety envelope that will be guiding the inspection activities at a later stage		
	1.4.5	Comprehension and analysis of the licensee's documents submitted to receive a license and other relevant licensee's documents		

1.5. Enforcement Process Competency: This competency is the provision of a supportable recommendation of enforcement action in accordance with regulatory body policy.

Low: Basic awareness and knowledge of the national enforcement policy, program, procedures and the legal authority of an inspector; understanding of an event or issue; capability to assist experienced inspectors in conducting enforcement proceedings.

Medium: Thorough knowledge of the enforcement process and application of the regulator's enforcement policy. Ability in identifying non-compliant situations during an inspection. Ability to differentiate between minor and major violations and experience to undertake a range of enforcement challenges and actions.

High: Demonstrated in-depth knowledge and extensive practical experience in addressing unusual situations and complex challenges, evaluating corrective measures proposed by the licensee and dealing with identified items of non-compliance. Ability to ensure that enforcement actions are carried out properly and in accordance with due legal processes.

Enforcement Process	1.5.1	Comprehension of enforcement policy and guidance		
	1.5.2	Comprehension of events and associated issues, such as plant performance data		
	1.5.3	Comprehension of regulatory body's procedures		
	1.5.4	Ability to determine what regulation and supporting documents apply to specific situations		
	1.5.5	Ability to identify non-compliant situations during an inspection		
	1.5.7	Ability to differentiate between minor and major violations		
	1.5.8	Ability to evaluate corrective measures proposed by the licensee and to determine if these will rectify identified items of non-compliance		
	1.5.9	Ability to secure corrective action by discussion and persuasion		
	1.5.10	Comprehension of the laws, regulations and bylaws that protect the rights of individuals		
	1.5.11	Understanding of the local criminal laws and their application		
	1.5.12	Ability to work with the local law enforcement units		

Quadrant 2: Competencies Related to Technical Disciplines

2.1. Basic Technology Competency: This competency is the comprehension of science and engineering fundamentals in a particular field equivalent to a university degree. Some typical science and engineering fields that are common to many regulatory bodies include: nuclear engineering; nuclear physics; chemical engineering; materials science; mechanical engineering; civil engineering; earth sciences; environmental engineering; computer sciences; and electrical engineering. A particular regulatory body may require competencies in other areas of science and engineering.

Low: Basic knowledge of a field of science or engineering such as would be typical of a university graduate with a major in the field, but without practical experience.

Medium: Advanced knowledge of a field of science or engineering such as would be typical of a holder of an advanced degree in the field or of an experienced practitioner, preferably with some experience in nuclear applications.

High: Comprehensive knowledge of a field of science or engineering such as would be typical of a holder of an advanced degree with extensive practical experience, preferably with extensive experience in nuclear applications.

Basic Technologies	2.1.1	Comprehension of one of the science fields at a basic level		
	2.1.2	Comprehension of one of the engineering fields at a basic level		

2.2. Applied Technology Competency: This competency is the additional comprehension and demonstrated ability to apply engineering and science concepts in relation to the nuclear industry. Some typical applied technology areas for which many regulatory bodies provide technical training for regulatory body staff include: reactor technology; fuel cycle technology; engineering techniques or technical issues; radiation protection as applied to nuclear facilities and to industrial uses of radioactive sources; and nuclear safety technology including safety and risk analysis. Regulatory bodies commonly provide such training to generalists to broaden their competencies in specific areas. Regulatory bodies sometimes also provide such training to specialists in areas other than their speciality to broaden their perspectives of how their speciality area relates to other areas for which the regulatory body has jurisdiction. A particular regulatory body may or may not require additional competencies in these or other areas.

Low: Basic knowledge of a field of applied science or engineering such as would be typical of a university graduate with academic study in the field, but without practical experience.

Medium: Advanced knowledge of a field of science or engineering such as would be typical of a holder of an advanced degree in the field or of an experienced practitioner with some experience in nuclear applications.

High: Comprehensive knowledge of a field of science or engineering such as would be typical of a holder of an advanced degree with extensive practical experience in nuclear applications.

Applied Technology	2.2.1	Comprehension of the design and operation of structures, systems, and components of regulated facilities from a regulatory perspective		
	2.2.2	Comprehension of engineering techniques or technical issues that are applied at facilities within the jurisdiction of the regulatory body		
	2.2.3	Comprehension and demonstrated ability in applying radiation protection principles at nuclear facilities		
	2.2.4	Comprehension of the design and operation of uses of radioactive sources from a regulatory perspective		
	2.2.5	Comprehension of risk assessment tools and techniques and how risk assessment is applied within the regulatory framework of the regulatory body		

2.3. Specialized Technology Competency: This competency is the comprehension and demonstrated ability to address and resolve issues in a specialized field. Some typical scientific fields or specialized areas that are common to many regulatory bodies include: instrumentation and control; criticality analysis; nuclear material control; software reliability; fire protection; human performance and human factors; fracture mechanics; corrosion chemistry; thermal-hydraulics; and health physics. A particular regulatory body may require specialized competencies in other areas.

Low: Basic knowledge of a specialized technology such as would be typical of a university graduate with academic study in a related field, but without specific training or practical experience in the specialized technology.

Medium: Advanced knowledge of a specialized technology such as would be typical of a holder of an advanced degree in a related field or of an experienced practitioner of the technology with some experience in nuclear applications.

High: Comprehensive knowledge of a specialized technology such as would be typical of a holder of an advanced degree in a related field with extensive practical experience in nuclear applications of the technology.

Specialized Technologies	2.3.1	Comprehension at a deep level of a scientific field or specialised area that provides sufficiently expert knowledge to address and resolve regulatory body technical issues		
	2.3.2	Ability to apply the knowledge of a scientific field or specialised area with sufficient expertise to be noted within the regulatory body (and perhaps the world) as an expert in the field or specialised area		

Quadrant 3: Competencies Related to Regulatory Practices

3.1. Safety-focused Analytical Techniques Competency: This competency is the objective analysis and integration of information using a safety focus to develop a supportable regulatory conclusion.

Low: Basic knowledge of regulatory practices and processes.

Medium: Thorough knowledge and practical experience in regulatory practices and processes and the capability to integrate information into a supportable regulatory conclusion.

High: Comprehensive knowledge and practical experience in regulatory practices and processes and the capability to synthesize information from many sources into regulatory decisions, and to exercise supervisory functions in the assigned areas.

Safety- focused Analytical Techniques	3.1.1	Comprehension of inspection reports, license reports, self assessments, responses to generic communications, and third party reports		
	3.1.2	Comprehension of assessment procedures		
	3.1.3	Appreciation and comprehension of current regulatory body emphasis (sensitivity and priorities)		
	3.1.4	Comprehension of PSA/PRA concepts		
	3.1.5	Ability to analyze, integrate, and evaluate technical information		
	3.1.6	Ability to make recommendations that are supportable by reliable information		

3.2. Inspection Techniques Competency: This competency is the independent gathering of information through objective review, observation and open communications, and determining acceptability of information by comparing it to established criteria.

Low: Basic ability to gather information and determine its acceptability and to assist experienced inspectors in performing their duties.

Medium: Ability and practical experience in using inspection techniques to gather information and compare it to established criteria to ensure licensee compliance with license conditions and regulations.

High: Comprehensive ability and practical experience in developing inspection programs and using inspection techniques and the capability to supervise inspections and take appropriate actions to ensure that licensees rectify non-compliance with licensing conditions and regulations.

Inspection Techniques	3.2.1	Comprehension of inspection procedures and techniques		
	3.2.2	Comprehension of industry codes and standards		
	3.2.3	Comprehension of regulations and regulatory guidance documents		
	3.2.4	Comprehension of regulatory body policies and standards facility inspection		
	3.2.5	Comprehension of plant specific or area specific technical information		
	3.2.6	Comprehension of PSA/PRA concepts		
	3.2.7	Comprehension of licensing documents, manuals and other reference material		
	3.2.8	Comprehension of licensee work schedule		
	3.2.9	Comprehension of previous inspection reports, allegation reports, licensee event reports, self assessments, responses to generic communications, and third party reports		
	3.2.10	Comprehension of root cause analysis techniques		
	3.2.11	Comprehension of facilities status		
	3.2.12	Comprehension of regulatory body allegations procedures		
	3.2.13	Comprehension of guidance for inspection reports		
	3.2.14	Comprehension of procedures for control of information (such as draft and allegation)		
	3.2.15	Ability in assessing the regulatory significance of inspection findings		
	3.2.16	Ability to evaluate information		
	3.2.17	Ability in interviewing		
	3.2.18	Ability in resolution of issues		
	3.2.19	Ability in observation		
	3.2.21	Ability to plan and organise inspections		
	3.2.22	Ability to recognise and address unusual or abnormal conditions		

	3.2.23	Appreciation of critical thinking/questioning approach		
	3.2.24	Ability to maintain objectivity and independence		
<p>3.3. Auditing Techniques Competency: This competency is the review of documents and/or programs for conformity to established standards and procedures and making recommendations based on the results.</p> <p>Low: Basic knowledge of auditing techniques and established standards for licensing submittals. Medium: Thorough knowledge and experience in auditing techniques and established standards, and the capability to formulate finding and recommendations based on the audit results. High: Comprehensive knowledge and experience in auditing techniques and established standards, and the capability to supervise audits and assume responsibility for communicating the results to licensee management.</p>				
Auditing Techniques	3.3.1	Comprehension of the process of auditing and established standards and procedures		
	3.3.2	Comprehension of the technical aspects of the subject matter of the audits		
	3.3.3	Ability to review and analyse documents against current standards and procedures		
<p>3.4. Investigation Techniques Competency: This competency is the pursuit of the cause of events arising from notifications, incidents or information obtained during inspections and/or evaluations and gathering evidence in order to make regulatory decisions.</p> <p>Low: Basic knowledge of procedures and techniques of investigation and gathering evidence. Medium: Thorough knowledge and experience in techniques and procedures of investigation, capability to lead simple investigations and communicate the investigation approach, rationale and objectives to the stakeholders and prepare a recommendation for regulatory action. High: Comprehensive knowledge and experience in techniques and procedures of investigation, capability to lead complex or sensitive investigations, to propose actions and inform stakeholders of the investigation progress, findings and potential serious regulatory actions.</p>				
Investigation Techniques	3.4.1	Ability to explain and interpret procedures that apply to investigations		
	3.4.2	Ability to decide when investigation is appropriate, based on receipt of information		
	3.4.3	Ability to evaluate information and circumstances and to decide if and when an inspection should become an investigation		

	3.4.4	Ability to identify a strategy appropriate to the circumstance and to provide advice on measures to mitigate the immediate risk		
	3.4.5	Comprehension of established procedures to conduct investigations		
	3.4.6	Ability to collect information and to decide on relevance to legal obligations		
	3.4.7	Ability to investigate complaints, incidents, ill-health and accidents for regulatory purposes in external organisations		
	3.4.8	Ability to investigate work related accidents, causes of ill-health and incidents in external organisations for regulatory purposes		
	3.4.9	Ability to gather and evaluate evidence in external organizations to determine ill-health/accident/incident/complaint causation, appropriate enforcement action and any other action needed by the regulatory authority or duty holders		
	3.4.10	Ability to inform duty holders, employee/safety representatives and others of the outcome of the investigations and actions proposed or required		
	3.4.11	Ability to secure appropriate reductions in risk in work activities and compliance with health and safety legislation in external organizations		

Quadrant 4: Competencies Related to Personal and Interpersonal Effectiveness

4.1. Analytical Thinking, Problem-solving and Decision-making Competency: This competency is approaching problems objectively, gathering and integrating information and developing a comprehensive understanding to reach conclusions.

Low: Basic capability equivalent to that of a university graduate to analyze and solve problems in a particular area of expertise, and to make decisions using guidance and criteria appropriate to the field of expertise.

Medium: Broad capability to analyze and solve problems involving multiple fields of expertise, and to select appropriate guidance and criteria and make decisions based on these criteria.

High: Broad capability to analyze and solve complex problems involving multiple fields of expertise, to integrate inputs from various sources, to select or develop appropriate guidance and criteria and make complex and difficult decisions.

	4.1.1	Ability to synthesize information, to analyze problems, and arrive at sound conclusions.		
	4.1.2	Ability to identify key issues, to analyze alternatives, and to recommend appropriate tactics and strategies.		

4.2. Personal Effectiveness Competencies:

Information Technology

Information Technology: This competency is using technology to create, gather, manipulate, communicate and/or share information.

Low: Basic understanding of the availability and use of the information technology resources of the organization.

Medium: Comprehensive understanding of the availability and use of the information technology resources of the organization, and the capability to instruct and guide others in the use of these resources.

High: Comprehensive understanding of the availability and use of the information technology resources of the organization, and the capability to understand current and future needs and to specify improved systems and procedures.

	4.2.1	Ability to use computer software for word processing, spreadsheets, internet communication, and data storage.		
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Planning and Organization of Work	<p>Planning and Organization of Work Competency: This competency is effective and efficient co-ordination of tasks to achieve a desired objective.</p> <p>Low: Basic ability to plan a limited number of tasks, to observe priorities and meet schedules set by supervisors and to produce results that meet the organization's quality standards.</p> <p>Medium: Ability to organize a work load consisting of multiple tasks, to set priorities and schedules based on guidance from supervisors, to co-ordinate inputs from others and to produce results that meet the organization's quality standards.</p> <p>High: Ability to organize a work load consisting of multiple tasks, to distribute portions of a task to others and co-ordinate their input, to set priorities and schedules for own work and that of other contributors, and to produce integrated results that meet the organization's quality standards.</p>		
	4.2.2	Ability to set priorities, to organise work, and to use time management techniques to meet scheduled objectives.	
	4.2.3	Ability to find simpler, faster and less costly ways to achieve objectives.	
<p>Self Management Competency: This competency is working independently, exercising judgment and exhibiting flexibility in the completion of activities, especially during difficult or challenging situations.</p> <p>Low: Basic capability to perform a limited number of assigned tasks independently, with flexibility in response to priorities set by supervisors, to exercise good judgment, and to produce quality results, including in times of stress.</p> <p>Medium: Capability to handle a workload of multiple tasks independently, with flexibility in setting priorities and schedules based on guidance from supervisors, to obtain assistance as needed and integrate results, and to exercise good judgment in producing quality results, including in times of stress.</p> <p>High: Ability to organize a work load consisting of multiple tasks, to exercise good judgment in distributing portions of a task to others and co-ordinating their input, in setting priorities and schedules for own work and that of other contributors, and in producing quality integrated results, including in times of stress.</p>			

Self Management	4.2.4	Ability to adapt behaviour to accommodate the sensitivities of others, to cope with stressful situations, and to sustain mental effort to achieve objectives.		
	4.2.5	Ability to recognise one's own strengths and weaknesses and to plan accordingly for personal training.		
	4.2.6	Ability to periodically assess one's own performance and to work for improvement.		
<p>4.3. Communication Competency: This competency is engaging in effective dialogue, representation and interaction with others (i.e., licensees, colleagues and public) through committed listening, speaking, writing or delivery of presentations, understanding the true interests of people and delivering meaningful messages.</p> <p>Low: Basic capability to communicate on technical matters in speech and writing, primarily with colleagues and supervisors within the organization, with limited interactions outside the organization.</p> <p>Medium: Ability to communicate clearly in speech and writing, both within and outside the organization, on technical matters, including interactions with technical colleagues, licensees and in public forums.</p> <p>High: Ability to communicate clearly in speech and writing, both within and outside the organization, on technical, licensing and policy matters, including interactions with technical colleagues, licensees and the public</p>				
	4.3.2	Ability to talk effectively in small groups and with large audiences.		
	4.3.3	Ability to listen effectively, to acquire information from others, and to determine the needs, interests and expectations of various groups.		
	4.3.4	Ability to write clear, concise, reports and to edit documents effectively.		
	4.3.5	Ability to respond appropriately to questions, and to provide factual answers consistent with the regulatory body's views.		
	4.3.6	Ability to communicate complex issues clearly and to convince audiences.		
<p>4.4. Teamwork Competency: This competency is working collaboratively with others to achieve common objectives.</p> <p>Low: Capability to work collaboratively with a small group of colleagues and a</p>				

supervisor.

Medium: Capability to work collaboratively with a group of colleagues and supervisors and to supervise one or more groups working on assigned tasks.

High: Capability to supervise multiple groups working on assigned problems and to work collaboratively with other supervisory level colleagues on broad issues of the organization.

Teamwork	4.4.1	Ability to cooperate well with other team members and to maintain a positive, cheerful atmosphere.		
	4.4.2	Ability to show flexibility in response to change, and to maintain commitment to team objectives even when one's own ideas are not supported.		

4.5. Management Competencies

Leadership	<p>Leadership Competency: This competency is exemplifying by practice of tolerance, objectivity, openness and fairness in dealing with colleagues and subordinates.</p> <p>Low: Exhibits tolerance, objectivity, openness and fairness in dealing with a group of colleagues and a supervisor, and can lead a work group if assigned to do so.</p> <p>Medium: Exhibits tolerance, objectivity, openness and fairness in dealing with colleagues, subordinates and supervisors, and leads assigned work groups.</p> <p>High: Exhibits tolerance, objectivity, openness and fairness in dealing with colleagues, subordinates and supervisors, and leads multiple work groups, usually in a supervisory capacity.</p>			
	4.5.1	Ability to adjust the level of authority and support to suit individual circumstances.		
	4.5.2	Ability to convey confidence in others' abilities, to give constructive feedback and coaching to staff members, and to inspire their enthusiasm.		
	4.5.3	Ability to be approachable and open to suggestions from others.		
	4.5.4	Ability to learn from past experience, to avoid future mistakes, and to ensure that commitments are met.		

	<p>Negotiation Competency: This competency is dealing with stakeholders to achieve a consensus view over a strategy or programme of actions to achieve safety improvements.</p> <p>Low: Capability to participate in negotiations related to technical matters, typically with colleagues or supervisors within a work group.</p> <p>Medium: Capability to participate in complex negotiations related to technical matters which may involve multiple work groups or outside stakeholders.</p> <p>High: Capability to participate in complex negotiations on technical, licensing and policy matters involving multiple internal and external stakeholders.</p>		
	4.5.5 Ability to resolve differences by encouraging alternative proposals, taking into account the positions of all interested parties, and facilitating open discussion.		
	<p>Project Management Competency: This competency is completing a set of complex tasks in a co-ordinated manner to preset time, scope and budget.</p> <p>Low: Capability to co-ordinate and complete assigned tasks of limited complexity within preset time, scope and budget.</p> <p>Medium: Capability to define, organize, co-ordinate and complete complex tasks within preset time, scope and budget.</p> <p>High: Capability to define, organize, co-ordinate and complete multiple complex tasks, usually in a supervisory role, and to set time, scope and budget for the tasks if not preset by supervisors.</p>		
	4.5.6 Ability to define projects, prepare a business plan, establish deliverables and success criteria, and to schedule activities		
	4.5.7 Ability to identify potential problems including resource allocation and alternate strategies for resolution		
	4.5.8 Ability to provide accurate, complete and timely project status report		

Appendix III

List of Technical Disciplines for Quadrant 2 Competencies

In consultation with various regulatory bodies, it was found that the subject matter relating to the technical competencies in Quadrant 2 might be considered to include some or all of the technical disciplines listed below. **Note that the need for specific subject matter on this list will depend on the scope of the national nuclear programme and the specific responsibilities of the regulatory body.**

Basic Sciences and Engineering

- Engineering Mathematics
- Atomic and Nuclear Physics
- Chemistry, incl. Radiation Chemistry
- Earth Sciences, incl. Geology, Seismicity, Meteorology, Hydrology, etc.
- Computer Science
- Nuclear Engineering, incl. Nuclear Reactor Concepts, Reactor Physics, etc.
- Chemical, Civil, Electrical, Environmental, Materials, Mechanical and Metallurgical Engineering

Applied Technologies

- Nuclear Reactor and Power Plant Technologies
- Nuclear Fuel Cycle Technologies, as applicable for the national programme
- Health Physics and Radiation Protection
- Electronics and Communication
- Computer-based Systems, incl. Software Reliability

Specialized Technologies

- Analogue and Digital Instrumentation and Control Systems
- Human Factors and Human Performance
- Reliability Analysis
- Reactor Safety Technology
 - Deterministic and Probabilistic Safety Analysis
 - Severe Accident Analysis
 - Passive Systems Analysis
- Thermal-hydraulics, incl. Computational Fluid Dynamics, Two-phase Flow, etc.
- Site Evaluation
- Mechanical Analysis, incl. Finite Element Methods, Fracture Mechanics, Seismic Analysis, etc.
- Fire Analysis and Protection Systems

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- Materials Protection, Control and Accountability
- Management of Spent Fuel and Radioactive Waste
- Criticality Safety
- Aging Management, incl. Radiation Effects on Materials, Corrosion, etc.

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