The Systematic Approach to Training: Analysis and Evaluation in the Department of Safeguards
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ABSTRACT
In applying a systematic approach to training (SAT), identifying the learning needs is the first step – a learning needs analysis allows the organization to identify the competencies required to perform a particular job. A systematic approach can provide a clear structure for training and education programme development as well as the necessary evaluation and feedback so that the organization can adjust the development accordingly and deliver the optimal learning experience. In this paper we will describe two key elements of a SAT used in the Safeguards Training Section in the Department of Safeguards: Analysis and Evaluation.

Analysis is the first part of a SAT needed to define competencies for safeguards staff in order to improve training development within the Department. We describe the training needs analysis used to capture and articulate the various competencies required for safeguards implementation based upon an analysis of tasks and activities carried out by staff members in the Department. Firstly, we highlight the different qualitative methods used to gather information from staff and the process of evaluating and organizing this information into a structured framework. Secondly, we describe how this framework provides the necessary reference to specify learning objectives, evaluate training effectiveness, review and revise training offerings, and select appropriate training paths based on identified needs.

In addition, as part of the SAT, evaluation is performed to identify the usefulness of course outcomes and improvements for future offerings based on lessons learned, to ensure that appropriate knowledge and skills are being taught and to demonstrate the value of training by meeting the organization’s needs. We present how the Kirkpatrick four level evaluation model has been implemented by Safeguards Training Section in order to evaluate course effectiveness after the training has been completed, and discuss how the current evaluation mechanism has benefitted the Section’s approach to training development and implementation.
TRANSLATING THE ORGANIZATION’S MISSION TO COMPETENCIES FOR TRAINING

Competencies are the combination of knowledge, skills, and behaviour (or attitudes) that support an organization’s mission, values, and goals. Competencies, as used by human resources management, can be the basis of a structured framework for recruitment, performance management, and staff development, as well as for identifying and addressing performance gaps through a learning needs analysis with appropriately designed strategies.

A SYSTEMATIC APPROACH: UNDERSTANDING COMPETENCIES REQUIRED

In applying a systematic approach to training (SAT), as illustrated in the figure below, identifying the learning needs is the first step. Conducting an analysis of learning needs allows the organization to identify the competencies required to perform a particular job.\(^1\) We want to highlight that the development of competent staff may be achieved by a variety of methods and not solely by a training course. Alternative learning opportunities include mentoring, on-line courses, on-the-job training, university classes, and 3-D learning.\(^2\)

In theory, a systematic approach can provide a clear structure for training and education programme development as well as the necessary evaluation and feedback so that the organization can adjust development accordingly and deliver the optimal learning experience.
Figure 1: The five steps of the SAT (analysis, design, development, implementation and evaluation) is a methodology to manage training programs.

The organization must be able to develop those competencies in a systematic and achievable manner. Competencies, derived from the analysis of the missions and goals at the organizational level, must be re-analysed and made relevant to the staff level. This is necessary because it is only possible to train staff – not an organization.

Competencies are defined within an organization to provide employees and management with an understanding of what is successful performance for both specific jobs and the overall organization. In many organizations, there may be two levels of competencies – core and functional. Core competencies are often broader sets of attributes that apply to all staff in the organization; “guiding principles” that help the organization and staff understand the values and behaviours expected. The IAEA’s Department of Management, for example, has identified the following core competencies: communication, analytical and strategic thinking, programme and individual performance, decision making, knowledge management, teamwork and change orientation. In this paper, we focus on the functional competencies in operations that are necessary to developing a concrete training and education programme to ensure effective IAEA safeguards implementation.\(^3\)

Before defining functional competencies, the organization must understand the tasks and roles carried out within its structure that are required to accomplish its mission. Functional competencies describe the knowledge and skills required of a specific job or task. By focusing on functional competencies, the organization can define a baseline from which to conduct a learning needs analysis, and put in place actions to develop the staff accordingly – through a variety of learning methods. A learning need is the gap between current level of performance in a particular competency area and the desired level to meet the organizational objectives. The learning needs analysis may be an iterative process, and must link the learning and development planning to the overall goals of the organizations.\(^4\)
Task Analysis

The IAEA Safeguards Training Section has conducted a component of the learning needs analysis to specifically look at the tasks carried out by one very important job category: the safeguards inspectors. A task analysis aims to capture the various activities that employees carry out (what they actually “do”) in order to fulfill their duties. Several methods can be used to elicit information about tasks. The methods we chose included 45 one-on-one semi-structured interviews, two days of job shadowing, and eight focus groups.

After reviewing existing materials and efforts to define competencies in operations, we began interviewing a selection of staff at different grades and in different divisions. This allowed us to capture the variety of responsibilities allocated across positions. Semi-structured interviews usually start with a predefined list of questions that ensure that a certain basis of information is gathered while also adding the flexibility to depart into areas of interest to the interviewer and interviewee (for example, if the interviewee is an expert or very experienced in one specific area that she/he can provide in-depth information about).

In job shadowing, we selected one competent staff member who was willing to be followed for two days while she carried out her duties. This gave us insight into the day-to-day organization of activities and the complexity of certain tasks. After conducting approximately 45 interviews, we were able to define a list of “competency areas”, which are a collection of tasks that fall into a logically coherent group of processes. These competency areas are: Core Safeguards, Inspection, Design Information Verification, Complementary Access, and Analysis and State Evaluation.

In a series of hour-long focus groups with training officers and operations staff, we collectively defined the tasks carried out within each competency area. Depending on the area, the tasks were organized according to different logics. For some competency areas, the separation into headquarters and field processes made sense; for other competency areas, an organization according to methods and equipment was more logical. For this collective “brainstorming” we used large sheets of paper and sticky notes which materially assisted a flexible way of gathering, visualizing, and organizing information. For this part of the job task analysis, it also helped that we had observed 12 training courses including the Introductory Course on Agency Safeguards (ICAS).
Once we defined a list of tasks that captured the vast majority of activities and processes carried out by inspectors, we vetted this list with training officers and other staff with particular experience in specific competency areas. In order to articulate the key knowledge, skills, abilities (KSAs) required for each task, we produced a list of 3-5 KSAs for each task. These KSAs then became the basis of assessing learning needs for inspectors, from which appropriate learning objectives were defined and the means to meet those learning objectives determined. Again, it is important to note that not all learning objectives need be or can be met through a training course.

<table>
<thead>
<tr>
<th>Competency area: Inspections</th>
<th>Specific KSAs</th>
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</thead>
<tbody>
<tr>
<td>Job activity or Task</td>
<td></td>
</tr>
<tr>
<td>Carry out measurement of spent fuel</td>
<td>Knowledge of fundamental nuclear properties of spent fuel</td>
</tr>
<tr>
<td></td>
<td>Ability to select and use the appropriate measurement devise</td>
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<td></td>
<td>Ability to interpret results of the measurement</td>
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Once the tasks are defined, the knowledge and skills required to carry out the tasks are identified. For example, the tasks and associated knowledge and skills required to be competent in “Inspections” are presented below.

**Competency Area**: Inspections

**Tasks**: may include
- Non-destructive assay (NDA) measurements
- Troubleshooting equipment
- Ensuring accuracy
- Briefing methods and results
From the identification of knowledge and skills, clear learning objectives can be described which then allow for the design and development of the means to achieve these objectives – be it through a training course, education curriculum or mentoring. The training and education approach can then be formulated to address the learning objectives, for instance, a 3-day training course on use of the reporting database with an accompanying on-line refresher once a year.

**EVALUATION MECHANISMS**

Evaluation is a crucial part of the systematic approach to training, not only to assess training effectiveness but also to ensure that the course content, implementation and training activities conform to the appropriate knowledge, skills, and abilities an organization is seeking to develop. Therefore, ongoing evaluation throughout the analysis, design, development, and implementation process can be simply performed by continuously asking: “will this training enable our staff to perform task XYZ?” By implementing this model, organizations have the ability to identify improvements and adjust accordingly.
The four level Kirkpatrick evaluation model is a useful and widely implemented tool to evaluate training effectiveness. The four levels allow an organization to evaluate to what degree participants 1) react favourably to the learning event 2) acquire intended knowledge, skills and abilities 3) apply what they learned when back on the job and 4) to what degree targeted outcomes occur and impact the organization. Level 1 (reaction) evaluation is done right after the training is finalized to check how well the training was received. Level 2 (learning) can be carried out by performing assessment tests or observing participants in a learning-by-doing environment. Level 3 (behaviour) seeks to evaluate if participants actually implement what they learned (1-3 months after the course) and ideally requires both their own assessment and their supervisors. Level 4 (results) looks at how this implementation impacts the organization.

**EVALUATION PROCESS IN SAFEGUARDS TRAINING SECTION**

The IAEA Safeguards Training Section conducts level 1-2 evaluation for all safeguards and Member States training courses. In 2013, this included evaluation of approximately 110 courses and for 2014 it is expected that over 120 courses will be evaluated. Online evaluation forms are created for submission by safeguards staff. For Member State courses a hard copy form is distributed. All submissions are anonymous in order to provide the trainees with the opportunity to react honestly and freely. Evaluation data is then collected and analysed to identify to what degree the learning event was considered favourable and to what degree participants’ level of understanding and confidence has increased after attending the training. A summary of the evaluation meeting discussions is generated, which describes the most
important aspects of the trainees’ reactions, as well as suggestions for improvement for the next offering of the course in order to continuously work on necessary enhancement of the training provided.

**BENEFITS OF PERFORMING EVALUATION**

Whereas the level 1-2 feedback provides information to what degree participants reacted favourably to the learning event, level 3 evaluation tells us something about the actual application of knowledge and skills on the job. The Safeguards Training Section has conducted level 3 evaluation in order to gain insight to what degree participants apply what they learned by asking for feedback from both staff members and their supervisors. I will use the Analytical Techniques training course as an example, to illustrate the usefulness of conducting level 3 post-evaluation.

The Analytical Techniques training course aims to provide participants with the opportunity to practice analytical techniques in a team setting to further individual and collaborative analytical skills required for the State evaluation process, including consistency analysis and acquisition path analyses. The Safeguards Training Section performed level 3 evaluation for the last three offerings of the course. Feedback shows that almost all participants replying to the survey have had the opportunity to apply what they learned. Depending on their assignments, there has been an equivalent opportunity to apply the taught techniques to a little, moderate and strong degree. Majority of participants were able to apply techniques taught immediately or after three months.

The information provided in immediate (level 1-2) and post-evaluation (level 3) data can be used in a number of ways to strengthen the development and implementation phase of the systematic approach to training. If a majority of participants provides feedback that course objectives have not been met, exercises don’t reflect on the job utilization, or the instructional approach did not contribute to the learning experience, then training officers return to the development and implementation phase and adjust the training offering accordingly. Similarly, level 3 feedback provides useful insight in the application of acquired knowledge and skills. This information can indicate if the training course reflects the learning objectives identified in the analysis and design phase to develop the appropriate competencies required in performing a certain task.
References

1 Boydell T and Leary M. (2003). Identifying training needs. CIPD retrieved from http://www.cipd.co.uk/nr/rdonlyres/5ae22874-1d3c-4912-bbd9-1c14803e8a44/0/1843981645sc.pdf


