

# EVALUATION REPORT

Evaluation of NRC's Training  
and Development Program

OIG-08-A-13 July 16, 2008



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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

OFFICE OF THE  
INSPECTOR GENERAL

July 16, 2008

MEMORANDUM TO: R. William Borchardt  
Executive Director for Operations

FROM: Stephen D. Dingbaum **/RA/**  
Assistant Inspector General for Audits

SUBJECT: EVALUATION OF NRC'S TRAINING AND DEVELOPMENT  
PROGRAM (OIG-08-A-13)

Attached is the Office of the Inspector General's (OIG) audit report titled, *Evaluation of NRC's Training and Development Program*.

This report presents the results of the subject evaluation performed by Booz Allen Hamilton, Inc., under contract to the NRC OIG. Agency comments provided at the exit conference on June 9, 2008, have been incorporated, as appropriate, into this report.

Please provide information on actions taken or planned on each of the recommendations within 30 days of the date of this memorandum. Actions taken or planned are subject to OIG follow up as stated in Management Directive 6.1.

We appreciate the cooperation extended to us by members of your staff during the evaluation. If you have any questions or comments about our report, please contact me at 415-5915 or Steven Zane, Team Leader, Financial and Administrative Audit Team, at 415-5912.

Attachment: As stated

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**Evaluation of the Nuclear Regulatory Commission's  
Training and Development Program**

**Contract Number: GS-23F-9755H**

**June 19, 2008**

The views, opinions, and findings contained in this report are those of the authors and should not be construed as an official Nuclear Regulatory Commission position, policy, or decision, unless so designated by other official documentation.

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## EXECUTIVE SUMMARY

### Background

The Nuclear Regulatory Commission (NRC) Strategic Plan highlights the need for the agency to provide a robust program of training, development, and knowledge transfer to ensure that agency employees attain and sustain the skills needed to implement the agency's mission.<sup>1</sup> NRC Human Resources Training and Development (HRTD) offers a program of training and development for NRC employees through the Professional Development Center (PDC) in Bethesda, MD, and at the Technical Training Center (TTC) in Chattanooga, TN. Course topics range from highly technical nuclear reactor and nuclear materials courses to leadership development to desktop computer skills.

While HRTD has successfully met the majority of NRC's training needs, the agency has identified a number of challenges that may impact the ability of the program to sustain the level of support it has provided to the agency thus far. Many of these challenges are the result of a planned increase of 600 new employees by 2009<sup>2</sup> to address the expected growth in licensing and construction of new nuclear power plants to meet the Nation's increased demand for energy production. Other challenges that will impact training and development includes the need for new skills in threat analysis and emergency preparedness, the introduction of new nuclear power technologies, increased licensing and regulatory activities to renew existing power plant licenses, increased need to train Agreement State personnel, impending attrition due to retirements, and a new emphasis on telecommuting.

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<sup>1</sup> United States, Nuclear Regulatory Commission, Strategic Plan Fiscal Years 2008-2013 (2003) 19.

<sup>2</sup> Dale E. Klein. Remarks Prepared for GE Nuclear Innovations Conference, Orlando, FL, 6 June 2007.

## **Purpose**

Due to the elevated significance of training, the Office of the Inspector General (OIG) identified a need to evaluate NRC's Training and Development Program to determine its effectiveness to meet current and future needs.

## **Results in Brief**

The evaluation team reviewed relevant existing reports on the Training and Development Program and conducted qualitative research consisting of one-on-one interviews with knowledgeable HRTD staff members, agency employees, managers, and executives, and found that:

- Efforts to maintain training documents, track changes, and control versions are not consistent across all branches within HRTD.
- Regional offices have difficulties in scheduling new and current employees for training. Additionally, some course schedules increase travel costs and time away from job responsibilities.
- HRTD has limited ability to demonstrate the impact of its Training and Development Program on NRC's mission using current performance measures.
- Current evaluation strategies are limited in their ability to demonstrate the effectiveness of training.
- HRTD's continued reliance on the traditional classroom as the primary delivery method for training is being strained by an increasing number of students as well as new training needs.
- In order to move into other forms of training delivery, HRTD will need to enhance or supplement the skill sets of its staff.

**Efforts to maintain training documents, track changes, and control versions are not consistent across all branches within HRTD.**

HRTD has developed operating procedures to define its processes for the development and management of training content. The evaluation team observed that content management practices varied among branches and instructors at both the TTC and PDC. Inconsistent and incomplete content management practices and tools have hampered HRTD's ability to manage and control content. The inability to consistently manage and control content impacts HRTD's ability to provide effective and relevant training and development programs.

**Regional offices have difficulties in scheduling new and current employees for training. Additionally, some course schedules increase travel costs and time away from job responsibilities.**

HRTD provides most of the formal training courses required for NRC qualification programs and for leadership training. Staff in the regional offices stated that it is often difficult for employees to schedule and attend the training that is necessary to attain or maintain qualifications or that is required for new supervisors. In addition, increasing travel costs have made it difficult to send employees to necessary training, especially when the training requires frequent, short-term trips to the Washington, DC, area. HRTD's annual training needs assessment has not been highly effective in getting the information needed from the regions in order to schedule training. Employees' inability to schedule training in a timely fashion has delayed the acquisition of skills needed to perform their jobs and meet qualification requirements.



**HRTD has limited ability to demonstrate the impact of its Training and Development Program on NRC’s mission using current performance measures.**

To show its value to the organization, the Training and Development Program must show how its training solutions link to strategic outcomes and if the solutions justify the cost. HRTD’s current performance metrics fail to provide meaningful insight into how its programs align with the agency’s mission and strategic goals, or demonstrate training efficiency and effectiveness. HRTD has encountered challenges in producing credible, reliable, and consistent performance measures. Without effective performance metrics, HRTD is unable to demonstrate its contribution to NRC’s mission and risks future support and funding.

**Current evaluation strategies are limited in their ability to demonstrate the effectiveness of training.**

A systematic evaluation approach and process allows for continuous improvement within the training function when aligned with organizational goals. NRC does not use a systematic evaluation process for continuously improving its training and development program because it has not:

- Developed a strategy for collecting pertinent evaluation data.
- Finalized the draft evaluation procedure.
- Evaluated the current Learning Management System (LMS) capability for data collection.

Without a strategy that standardizes the training evaluation procedure and metrics, NRC cannot accurately measure and monitor its achievement of goals.

**HRTD's continued reliance on the traditional classroom as the primary delivery method for training is being strained by an increasing number of students as well as new training needs.**

NRC is facing workforce challenges that make e-learning a viable alternative to the traditional classroom, which is currently used for the majority of courses. HRTD has recognized the benefit that new training methodologies could bring to the agency and has deployed a new LMS which expands on-line learning capabilities. However, HRTD has not developed an e-learning strategy or implementation plan to maximize the benefits of this investment and ensure it is helping HRTD meet the agency's most pressing training needs. HRTD staff is strained to meet all of the training needs in the traditional classroom with its current staff and facility resources, but additional funding to support e-learning initiatives may be difficult to obtain without a defined strategy and implementation plan.

**In order to move into other forms of training delivery, HRTD will need to enhance or supplement the skill sets of its staff.**

Organizations that have implemented e-learning solutions have found the skills needed to develop technology-enabled learning are very different from those needed for classroom instruction. Staff in HRTD noted that there are limited skills and resources for the development and deployment of e-learning among the current staff. If NRC plans to implement more e-learning solutions, HRTD will need to find ways to close the e-learning skill gaps—either through training, hiring, or outsourcing. Attempting to develop effective e-learning programs without the necessary skills can lead to frustration for the staff and ineffective learning opportunities for employees.

### **Recommendations:**

We recommend that the Executive Director for Operations:

1. Review the current course files to identify gaps in necessary documentation.
2. Develop a plan and timeline for completing any missing course documentation.
3. Complete HRTD Operating Procedure 404 – Training Material Control, to include a standard process for version control, tracking changes, and assigning accountability for changes.
4. Develop a plan to centralize course materials in one location, preferably a central repository on a shared server.
5. Develop a lifecycle maintenance procedure for periodically reviewing courses to ensure the learning objectives are still valid, the delivery mechanism is still the most effective, or the course is still meeting stakeholder needs.
6. Form a working group of select representatives from the program offices, regional offices, and HRTD to conduct a thorough review of the training calendar including location and frequency of courses, travel costs, and opportunities for efficiencies in course sequencing (i.e., course bundling). The group should identify problems and develop mutually agreed-upon solutions within the constraints of contractual agreements, budgets, and resources.
7. Within contractual limitations, identify and schedule courses at the same time each year so employees can anticipate the availability of courses. Communicate these courses and dates widely to make sure employees, supervisors, training coordinators, and managers are aware of the annual schedule.
8. Before implementing the enforcement of course prerequisites in the Learning Management System:
  - a. Determine the impact on employees' ability to take all required training within the allotted timeframe.
  - b. Communicate the change to NRC personnel in advance and allow opportunities for feedback.

9. Develop and implement new performance metrics to demonstrate mission alignment, effectiveness, and efficiency.
10. Develop and implement a plan to leverage the capabilities of the LMS for collection and reporting of chosen metrics. Specifically, evaluate the competency model capabilities to determine if they meet NRC's needs, including identifying competencies, linking courses (or course modules and learning objectives) to identified competencies, and closing critical skill gaps.
11. Develop and implement a comprehensive cost tracking capability (including cost data for each course) to determine the most economical and efficient method to meet NRC's training needs.
12. Finalize Operating Procedure 410 including a new standardized student feedback form.
13. Develop an evaluation strategy plan that defines the data HRTD needs to collect at varying levels to demonstrate the impact of its programs on the agency.
14. Evaluate the capability for collecting evaluation data via the Learning Management System.
  - a. If the Learning Management System's capabilities meet the agency's needs, develop a business case for purchase and deployment of additional capabilities.
  - b. If the Learning Management System's capabilities do not meet the agency's needs, develop a plan for using alternative technologies to collect and analyze evaluation data.
15. Develop an e-learning strategy that establishes a broad, fundamental connection between e-learning and organizational mission, strategy, business objectives and performance improvement.
16. Develop an implementation plan for e-learning that includes, at a minimum:
  - a. An assessment of NRC's baseline technology.
  - b. A plan for roll-out, implementation, maintenance and ongoing evaluation of additional Learning Management Systems capabilities. The

implementation plan should include a cost/benefit analysis of the available LMS features and how they can support NRC's business needs.

17. Develop a process similar to the Strategic Workforce Planning Process to:
  - a. Determine the e-learning skill sets necessary to meet NRC's business needs.
  - b. Assess the current staff to determine the availability of the needed skills.
  - c. Develop a plan to close any identified gaps—either through training, hiring, or outsourcing.

### **Agency Comments**

OIG provided this report in draft to agency officials on June 3, 2008, and discussed its content at an exit conference on June 9, 2008. We modified the report as we determined appropriate in response to the discussion. Agency officials generally agreed with the report's findings and recommendations and opted not to provide formal comments.



A handwritten signature in black ink, appearing to read 'Ann Lead', is positioned above the date '06/19/08'.

Booz | Allen | Hamilton

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## **ABBREVIATIONS AND ACRONYMS**

ASTD	American Society for Training and Development
FY	fiscal year
GAO	United States Government Accountability Office
HRMS	Human Resources Management System
HRTD	Human Resources Training and Development
LMS	Learning Management System
NRC	United States Nuclear Regulatory Commission
NRO	Office of New Reactors
OIG	Office of the Inspector General
PDC	Professional Development Center
ROI	Return on Investment
SAT	Systems Approach to Training
SOW	Statement of Work
SWP	Strategic Workforce Planning
TTC	Technical Training Center

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# TABLE OF CONTENTS

- 1. Background** 3
- 2. Purpose** 6
- 3. Findings** 7
  - 3.1 Content Management 7
  - 3.2 Effectiveness and Efficiency of the Training Calendar 14
  - 3.3 Performance Metrics 20
  - 3.4 Evaluation Strategies 30
  - 3.5 Alternative Delivery Mechanisms for Training 37
  - 3.6 Staff Skill Sets 43
- 4. Consolidated List of Recommendations** 47
- 5. Appendices** 50
  - A.1 Scope and Methodology 50
  - A.2 Materials Reviewed 57
  - A.3 Suggested Components of an e-Learning Implementation Plan 61
  - A.4 Training Evaluation Levels 63



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## 1. Background

The Nuclear Regulatory Commission (NRC) Strategic Plan highlights the need for the agency to provide a robust program of training, development, and knowledge transfer to ensure that agency employees attain and sustain the skills needed to implement the agency's mission.<sup>3</sup> NRC Human Resources Training and Development (HRTD) has articulated its plan to help the agency accomplish its mission and goals in the NRC Training and Development Strategic Plan, which focuses priorities and resources in an effort to achieve measurable results.<sup>4</sup>

HRTD's plan contains four goals:

1. Training and development enhance individual performance.
2. Agency training needs are identified and met.
3. Training resources are optimized and the agency realizes the intended benefits.
4. Training policies and practices encourage continuous improvement and optimal organizational performance.<sup>5</sup>

HRTD offers a program of training and development for NRC employees through the Professional Development Center (PDC) in Bethesda, MD, and at the Technical Training Center (TTC) in Chattanooga, TN. Course topics range from highly technical nuclear reactor and nuclear materials courses to leadership development to desktop computer skills. To make learning opportunities as widely accessible as possible, HRTD offers some courses in the regional offices or at other locations across the United

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<sup>3</sup> United States, Nuclear Regulatory Commission, Strategic Plan Fiscal Years 2008-2013 (2003) 19.

<sup>4</sup> United States, Nuclear Regulatory Commission, Training and Development Strategic Plan, NUREG/BR-0332 (Feb 2007) 1.

<sup>5</sup> Training and Development Strategic Plan 3.

States. HRTD also launched a new Learning Management System (LMS) in April 2008 which expands NRC's online learning capabilities.

While HRTD has successfully met the majority of NRC's training needs, the agency has identified a number of challenges that may impact the ability of the program to sustain the level of support it has provided to the agency thus far. Many of these challenges are the result of a planned increase of 600 new employees by 2009<sup>6</sup> to address the expected growth in licensing and construction of new nuclear power plants to meet the Nation's increased demand for energy production.<sup>7</sup> NRC's ability to effectively review and license the new generation of commercial nuclear reactors will depend significantly on how well new employees are trained and developed to be effective reviewers and regulators at the staff and senior management level.<sup>8</sup>

In addition to a significant increase in staffing levels, NRC faces other challenges that will impact training and development.

- Needs for new critical skills, such as threat analysis and emergency preparedness, have emerged because of 9/11.
- New technologies in the nuclear power industry (e.g., the replacement of analog safety systems and control room instrumentation with digital systems) will also require new skill sets.
- Increased licensing and regulatory activities will be associated with the renewal of existing power plant licenses and requests for reactor power uprates. NRC is also planning for the licensing of Yucca Mountain as a high-level waste repository.

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<sup>6</sup> Dale E. Klein. Remarks Prepared for GE Nuclear Innovations Conference, Orlando, FL, 6 June 2007.

<sup>7</sup> HRTD is partnering with the Office of New Reactors (NRO) to develop new courses to address the construction and licensing of new reactors and their associated technologies. According to an NRO representative, the new curriculum needs to be available in two years. HRTD has piloted two courses for construction inspection and is beginning development of a construction quality assurance course. In some instances, NRO and HRTD are using the skills of rehired annuitants to assist in the development of these courses.

<sup>8</sup> United States, Nuclear Regulatory Commission, Fiscal Year 2006 Performance and Accountability Report (2006) 132.

- The agency has an increased need to train staff on risk-informed and performance-based regulatory approaches.
- As more NRC Agreement States assume the regulatory responsibilities for nuclear materials, these States have an increased need to train their personnel.
- NRC expects a high rate of attrition in the coming years as members of its highly technical workforce become eligible for retirement.
- NRC is hiring a younger generation of employees to replace the retiring workforce. As of May 24, 2008, the average age of the workforce had dropped to 46.9 and 11 percent of the permanent workforce was age 29 or under. NRC is continuing its efforts to hire younger employees.
- In order to attract and retain new employees, NRC has identified the need to offer more attractive benefits like telecommuting, which will increase the demands on the agency's technical infrastructure and traditional classroom training methods.<sup>9</sup>

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<sup>9</sup> United States, Nuclear Regulatory Commission, Fiscal Year (FY) 2004-2009 Strategic Human Capital and Workforce Restructuring Plan (March, 2003) 3-4.

## 2. Purpose

Due to the elevated significance of training, the Office of the Inspector General (OIG) identified a need to evaluate NRC's Training and Development Program to determine its effectiveness to meet current and future needs. The OIG requested a thorough analysis of the program's efficiency and effectiveness, combining a review of relevant existing reports on the program as well as qualitative research consisting of one-on-one interviews with knowledgeable HRTD staff, agency employees, managers, and executives. This evaluation did not include a review of specific courses or curricula, e.g., new reactor licensing, new reactor construction, or the next generation of reactor technologies.

The evaluation team assessed the program to determine if it was:

- **Scalable:** Were current training methods and development activities and tools sufficient to accommodate fluctuations in the size of the workforce?
- **Accountable:** Were agency training needs systematically identified and were they being met by the current curriculum?
- **Trackable:** Did the metrics, tools, and information gathering devices in use adequately identify whether training and employee development activities achieve required individual and organizational performance goals?
- **Aligned with Mission:** Were training resources, including funding, aligned so that employees receive the training and performance support they need, when they need it, so that they are ready to perform as soon as possible after being brought into the agency?

Appendix A.1. includes a detailed description of the methodology used for this evaluation.

### **3. Findings**

The evaluation team reviewed background documentation and interviewed knowledgeable NRC staff members to develop a good understanding of the current Training and Development Program. Our analysis identified the following areas for improvement:

1. Efforts to maintain training documents, track changes, and control versions are not consistent across all branches within HRTD.
2. Regional offices cited difficulties in scheduling new and current employees for training. Additionally, some course schedules increase travel costs and time away from job responsibilities.
3. HRTD has limited ability to demonstrate the impact of its Training and Development Program on NRC's mission using current performance measures.
4. Current evaluation strategies are limited in their ability to demonstrate the effectiveness of training.
5. HRTD's continued reliance on the traditional classroom as the primary delivery method for training is being strained by an increasing number of students as well as new training needs.
6. In order to move into other forms of training delivery, HRTD will need to enhance or supplement the skill sets of its staff.

#### **3.1 Content Management**

HRTD has developed operating procedures to define its processes for the development and management of training content. The evaluation team observed that content management practices varied among branches and instructors at both the TTC and PDC. Inconsistent and incomplete content management practices and tools have hampered HRTD's ability to manage and control content. The inability to consistently manage and control content impacts HRTD's ability to provide effective and relevant training and development programs.

3.1.1 HRTD has developed operating procedures to define its processes for the development and management of training content.

HRTD has recognized that following an industry-recognized process (the Systems Approach to Training<sup>10</sup>) for the development of training materials is the first step toward achieving training effectiveness. HRTD's Operating Procedure No. 406 states that HRTD staff and contractors will use the Systems Approach to Training (SAT) in the development of course content.<sup>11</sup> As articulated in HRTD's operating procedure, documents generated as part of the SAT process include:

- Needs analysis.
- Training plan.
- Learning objectives.
- Course materials including course manuals and presentation materials.
- Lesson plan.
- Exam bank.
- Course feedback tools.
- Training aids.

HRTD has also recognized that maintaining and updating training materials is critical to providing an effective and relevant Training and Development Program. In the Training and Development Strategic Plan, HRTD states that courses must contain current regulatory, technical, and policy information so students have the latest information to

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<sup>10</sup> The Systems Approach to Training is an industry-recognized process for the analysis, design, development, implementation, and evaluation of training programs.

<sup>11</sup> United States, Nuclear Regulatory Commission, Human Resources Training and Development (HRTD) Operating Procedure (OP) No. 406: Training Program Development Process, 30 June 2007.

assist them in the performance of their duties.<sup>12</sup> HRTD is currently developing HRTD Operating Procedure 404 – Training Material Control which outlines a process for identifying and making content updates.<sup>13</sup>

Bersin & Associates, a leader in training and development research, has found many organizations are putting greater efforts into content management strategies to increase efficiency and effectiveness, ensure content quality and consistency, and meet compliance requirements by controlling content versions and tracking changes.<sup>14</sup>

Content management strategies usually address the following:

- **Centralization of learning content** - A central repository for all learning content makes it easier for organizations to ensure all learning content is complete and facilitates identification of reusable content.<sup>15</sup>
- **Content maintenance** – For training to remain relevant and effective, the content must be regularly maintained to ensure it is up-to-date, correct, and complete. Maintenance, along with version control and tracking, are easier when all content is centrally located and searchable.<sup>16</sup>
- **Course review** – Beyond content maintenance, organizations should periodically review courses to ensure learning objectives, delivery methods, and evaluation strategies are still valid; the learning objectives still support the mission; and stakeholder needs are still being met. Organizations need a plan to identify a systematic “review, revise and release cycle” which includes triggering mechanisms and measurement criteria.<sup>17</sup> Such a lifecycle maintenance process provides an opportunity for the organization to determine if the course still meets

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<sup>12</sup> [Training & Development Strategic Plan](#), 6.

<sup>13</sup> United States, Nuclear Regulatory Commission, [Human Resources Training and Development \(HRTD\) Operating Procedure \(OP\) No. 404: Training Material Control](#), (in draft).

<sup>14</sup> Chris Howard, “Learning Content Management Systems: What Works,” [Bersin & Associates](#), Oct 2005, 9.

<sup>15</sup> Howard, 10.

<sup>16</sup> Bill Brandon, “Handbook of e-Learning Strategy,” [The e-Learning Guild](#), 2007, 7.

<sup>17</sup> Bill Brandon, “Handbook of e-Learning Strategy,” [The e-Learning Guild](#), 2007, 7.



the business needs and to ensure the course is still fresh, timely, and engaging for learners.

### 3.1.2 Content management practices varied among branches and instructors at both the TTC and PDC.

The evaluation team interviewed a total of eleven instructors, eight instructors at the TTC and three instructors at the PDC. Of those instructors interviewed, seven instructors stated that they adhere to elements of the SAT process and develop most of the prescribed documentation. Two instructors for nuclear materials courses stated that they have not followed the complete process and, as a result, some of the course documents are missing or incomplete. Because of their familiarity with the subject matter, some instructors have forgone the development of some training materials (e.g., lesson plans and learning objectives) and rely solely on their presentation materials as their course documentation.

The current practice for keeping learning content up-to-date is inconsistent and sometimes informal. HRTD instructors are using several different means to identify and incorporate necessary changes in course materials. During this evaluation, HRTD was in the process of drafting a new procedure for the control of training materials. Although HRTD has not yet implemented the procedure, the evaluation team did find that some instructors were using the Training Deficiency Materials Report prescribed by the draft procedure to identify necessary changes and assign accountability for making revisions.<sup>18</sup> Other instructors stated that they make necessary updates to course materials as they prepare to instruct each session. Some instructors rely on subject matter experts within NRC to inform them of necessary changes. Instructors stated that students have identified outdated material in their courses. In many cases, needed

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<sup>18</sup> The Training Materials Deficiency Report is contained in HRTD's draft Operating Procedure 404 – Training Material Control. The operating procedure discusses the use of a paper system using the Training Materials Deficiency Report as a tracking mechanism for training material discrepancies. The procedure also allows for the use of a paperless system, such as a spreadsheet or database, in lieu of the paper form.

changes identified by students or instructors were communicated verbally or informally. For most contracted courses, HRTD relied on the contractor to make updates.

The evaluation team did not note or observe any mechanism or quality assurance process to ensure changes are incorporated consistently across multiple affected courses. Individual instructors make changes to the courses for which they are responsible. The evaluation team noted that there appears to be no mechanism in place to determine if a change might impact more than one course. Any efforts to make content changes across multiple courses would be difficult because HRTD does not have a means to centralize or search all course materials. HRTD has encountered technology barriers to centralizing its course materials and is currently conducting a baseline assessment of its technical infrastructure. One of the objectives is to determine how it can centralize training materials.

While HRTD performs almost continuous updates to training materials as content changes are identified, it does not have a procedure in place to review course materials in a more holistic manner. Simply updating course content does not ensure that the course still meets the learning objectives, that the learning objectives are still valid, that the delivery mechanism is still the most effective, or that the course is still meeting the needs of stakeholders. HRTD has conducted such reviews for some courses and curricula when they have identified issues. However, there is no procedure for conducting course reviews on a more proactive basis.

### 3.1.3 Inconsistent and incomplete content management practices and tools have hampered HRTD's ability to manage and control content.

Although HRTD has a procedure in place for the development of courses according to the SAT process, managers have not consistently enforced the procedure across all branches of the Training and Development Program. The varying degree to which instructors adhere to the principles of the SAT process results in gaps in HRTD's course materials and supporting documentation.

HRTD has not completed or implemented the new procedure for the control of training materials. Since current practices to update course content are inconsistent, students and supervisors have found that course materials are sometimes outdated or incorrect.

In addition, the lack of a central location (or repository)<sup>19</sup> for all course materials hampers the ability of instructors to search content and make changes consistently across all courses. It also hampers the ability of HRTD management to ensure that all prescribed course materials are in place and up-to-date. During this evaluation, HRTD management and regional offices identified deficiencies with the agency's IT infrastructure, particularly inadequate bandwidth, as contributing factors in the inability to share training materials across the agency. A representative from the Office of Information Systems (OIS) is currently working with HRTD to evaluate their current technology baseline and the infrastructure needed to support their strategic goals.

Since HRTD does not have a policy or procedure for the lifecycle maintenance of courses, there is no mechanism in place to ensure HRTD periodically reviews courses. Consequently, courses may be out of alignment with business needs and learning objectives. Also, other delivery methods may prove to be more cost effective or efficient.

#### 3.1.4 The inability to consistently manage and control content impacts HRTD's ability to provide effective and relevant training and development programs.

Since instructors are not always following the prescribed SAT process, course materials are sometimes incomplete. While seasoned instructors may feel comfortable relying solely on their presentation materials to teach courses, such an approach does not ensure that instructor knowledge is transferred to the next generation of instructors hired by the agency. As current instructors retire and HRTD looks to more e-learning

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<sup>19</sup> "Central location" refers to a shared site or shared server that may be accessed by all HRTD personnel. A repository is a more sophisticated software system that facilitates the discovery, sharing, and reuse of learning content. Repositories often have well-designed user interfaces and architectures that make them easy to use and permit various levels of interactivity including search, submissions, comments/reviews, and creating personal collections.

and blended strategies for training, it will be critical to have up-to-date and accurate materials that new instructors and instructional designers can rely upon for course design and delivery.

Additionally, the potential for course materials to be out-of-date or incomplete is increased due to the lack of a defined procedure for the control and maintenance of training materials. Staff members stated that they have noted outdated or incorrect material in some courses. For example, in the materials and fuel facilities areas, students and supervisors stated that materials were not always up-to-date, particularly for self-study or where technology changes rapidly. If students are finding outdated material in courses, it risks putting the credibility of the course into question.

Since HRTD lacks a central repository for course materials, master course files and materials are stored and maintained in multiple locations. As a result, it is difficult for instructors to search across courses to identify information that may need to be updated or changed. The possibility exists for students to get conflicting information in different courses.

Because HRTD does not have a procedure to review courses periodically as a whole, they may be offering courses, or parts of courses, that are no longer relevant or aligned to the mission of the agency or they may be missing opportunities to identify more effective or efficient delivery methods.

#### **RECOMMENDATIONS:**

We recommend that the Executive Director for Operations:

1. Review the current course files to identify gaps in necessary documentation.
2. Develop a plan and timeline for completing any missing course documentation.
3. Complete HRTD Operating Procedure 404 – Training Material Control, to include a standard process for version control, tracking changes, and assigning accountability for changes.

4. Develop a plan to centralize course materials in one location, preferably a central repository on a shared server.
5. Develop a lifecycle maintenance procedure for periodically reviewing courses to ensure the learning objectives are still valid, the delivery mechanism is still the most effective, or the course is still meeting stakeholder needs.

### **3.2 Effectiveness and Efficiency of the Training Calendar**

As stated in the Training and Development Strategic Plan, one of HRTD's goals is to identify and meet the agency's training needs. HRTD provides most of the formal training courses required for NRC qualification programs and for leadership training. Staff in the regional offices stated that it is often difficult for employees to schedule and attend the training that is necessary to attain or maintain qualifications or that is required for new supervisors. In addition, increasing travel costs have made it difficult to send employees to necessary training, especially when the training requires frequent, short-term trips to the Washington, DC, area. HRTD's annual training needs assessment has not been highly effective in getting the information needed from the regions in order to schedule training. Employees' inability to schedule training in a timely fashion has delayed the acquisition of skills needed to perform their jobs and meet qualification requirements.

3.2.1 The Training and Development Strategic Plan states that HRTD is responsible for identifying and meeting the agency's training needs.

In order to meet its safety goals, NRC has noted the importance of maintaining trained inspectors at nuclear power reactors, fuel cycle sites, regional offices, and the agency's Headquarters.<sup>20</sup> To ensure NRC personnel can effectively review and license nuclear reactors and regulate the use, transportation, storage, and disposal of radioactive materials, the agency has developed highly structured qualification programs that include a significant amount of formal training along with self-study assignments and on-

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<sup>20</sup> Strategic Plan Fiscal Years 2004-2009, 10.

the-job training. Inspectors, reviewers, and examiners must successfully complete the applicable requirements of the qualification programs within 24 months.

According to NRC Inspection Manual Chapters 1245 and 1246, employees are required to take the formal qualification training courses in sequence—completing basic level prerequisite courses before enrolling in the more advanced courses. The manual chapters state that a deviation is required from the program office to allow an employee to take the courses out of sequence. Additionally, inspectors are required to attend advanced and refresher training to maintain their inspector qualifications and keep current with inspection and licensing programs. The qualification programs include self-study, formal training courses, and on-the-job training.

In addition to the technical skills necessary to support the agency's licensing and regulation activities, NRC supervisors in some regions and program offices are required to complete a series of leadership courses within two years of assuming a supervisory role.<sup>21</sup> These leadership development courses range in length from .5 days to 4 days.

The TTC and PDC provide most of the formal training courses required for NRC qualification programs and for supervisory training. These training courses range in length from less than a day to several weeks and are offered mainly at the TTC in Chattanooga, TN, or the PDC in Bethesda, MD. HRTD offers some of these courses in the four regional offices.

The Training and Development Strategic Plan contains two goals that address the scheduling and delivery of training courses. Goal 2 is to "...ensure agency training needs are identified and met."<sup>22</sup> As a part of Goal 2, HRTD has noted that close coordination with program offices and regional offices is critical to identifying and

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<sup>21</sup> United States, Nuclear Regulatory Commission, Region II, Regional Office Instruction, No. 0402, Rev. 5, 20 April 2005.

<sup>22</sup> Training and Development Strategic Plan, 5.

understanding training needs, as well as to coordinate training and development activities.

Goal 3 in the Strategic Plan states that HRTD will, "...ensure training resources are optimized and the agency is realizing the intended benefits of training."<sup>23</sup> One of the strategies HRTD listed for meeting this goal is to, "...improve the processes for planning, budgeting, and scheduling training and development resources and activities." The plan identifies the need for HRTD to improve its methods for anticipating training needs and for improving the training needs survey (also called the training needs assessment).

3.2.2 During the course of this evaluation, numerous employees and supervisors noted obstacles they or their staff members have in scheduling training that is necessary for them to do their jobs as inspectors, reviewers, examiners or supervisors.

In general, regional staff noted the following difficulties in scheduling employees for needed training courses:

- **Inability to plan training far enough in advance** – Inspection schedules are determined 18 months in advance. Once an inspection is planned, any changes to the schedule are highly discouraged. Since HRTD publishes some training opportunities only six to twelve months in advance, inspectors find it difficult to plan their inspection calendars around the training courses they need to take. The fact that some courses are offered infrequently (1-2 times per year) complicates the matter further.

HRTD has initiated an effort to schedule some courses (particularly those taught by HRTD staff) at the same time each year to allow employees to plan training opportunities, but the ability to schedule other courses 18 to 24 months in

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<sup>23</sup> Training and Development Strategic Plan, 8.

advance may be limited by contractual requirements. Some NRC personnel were not aware that HRTD schedules some courses at the same time each year.

- **Problems scheduling new employees into the necessary qualification training programs** – Regional office supervisors noted that they have had difficulties getting new employees into requisite training programs immediately upon hire. Since employees cannot conduct inspections until they have completed the basic training requirements, offices cannot use new employees as quickly as they would like in the inspection process.

Supervisors and employees have developed “work arounds” to help alleviate the problem, but these alternatives are not always in the best interest of the employee or the agency. For example, some employees enroll in training courses out of sequence so they can complete their qualification training during the required timeframe. Although the inspection manual states that a deviation is required to take the courses out of order, the requirement has not been consistently enforced. The new Learning Management System (LMS) has the capability to enforce the completion of prerequisite courses before allowing enrollment in subsequent courses, which may further extend the time needed to complete qualification requirements. However, this capability has not yet been implemented. In other instances, supervisors stated that they register for training courses in their own name to hold a space for new hires. When the employee is hired, the supervisor will request that HRTD switch the registration into the new hire’s name. If the employee is not hired in time to take the class, the slot may go unfilled, thus preventing others from attending the training and incurring an unnecessary cost for HRTD.

- **Excessive travel costs and reduced productivity to send employees, especially new supervisors, to requisite training** – Several of the new supervisor training courses are of very short duration and are offered mainly at the PDC. The regional offices have found it burdensome and costly to send their employees to the Washington, DC, area multiple times for short courses.



Although HRTD has occasionally offered some of these courses in the regional offices, the regions still find it difficult to include the resident inspectors who are located at multiple sites. In addition, HRTD has responded to regional needs by offering some courses consecutively to reduce the number of times an employee must travel to complete the training. Two courses in the supervisory series are now available online or on DVD.

### 3.2.3 HRTD's annual training needs assessment has not been highly effective in providing the information needed to plan an effective training calendar.

HRTD solicits training requirements from the regional offices and program offices via an annual training needs assessment. The assessment asks agency personnel to project the number of employees they will send to HRTD training courses in each quarter of the fiscal year. In addition, it provides offices an opportunity to identify new training needs. HRTD also works through the training coordinators in the regional and program offices to identify training needs.

HRTD has recognized the need to improve their training needs assessment as mentioned in the Training and Development Strategic Plan. Regional personnel stated that the annual assessment may not be the most effective method for planning annual training events; especially since it only projects training needs for 12 months. They also stated that their input has not always been accurate and complete.

The structure of the training needs assessment does not provide opportunities for NRC personnel to identify scheduling problems, such as those mentioned above. Engaging select supervisors in a working group to conduct a review of the training calendar may be a more effective means of gaining meaningful input from the regions and program offices. The group could consider the following measures to improve the training calendar:

- Offer courses in more convenient/cost-effective locations.

- Combine courses to reduce travel costs.
- Publish training activities at least 18 months in advance.
- Use more alternative delivery methods such as Web-based training or video teleconferencing.

All decisions must necessarily take into account contractual agreements, budgets, and available resources. The working group format would allow a two-way dialog between HRTD and field personnel that is not currently supported by the needs assessment.

As mentioned above, HRTD has two initiatives underway that may impact the ability of employees to plan training in advance. First, HRTD's effort to schedule courses at the same time each year should allow employees to better plan training opportunities in advance, but the ability to schedule some courses 18 to 24 months in advance may be limited by contractual agreements. Secondly, if HRTD chooses to enforce the completion of prerequisites using the LMS, it may increase the length of time necessary for employees to complete the required courses.

3.2.4 Employees' inability to schedule training in a timely fashion has delayed the acquisition of skills needed to perform their jobs and meet qualification requirements.

Delays in obtaining training have affected the ability of supervisors to schedule new employees for necessary work assignments. With the increasing inspection workload, supervisors need to ensure employees are able to be fully productive as soon as possible. In some instances, employees have been on training course wait lists for a significant amount of time before they could get into the necessary training.<sup>24</sup> A few

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<sup>24</sup> Several factors influence the length of time an employee must wait to get into a course, including the type of course, the frequency with which it is offered, and when the employee requires the training for qualification or requalification. For example, HRTD only offers some courses twice a year, so the wait may be 6 to 12 months. The wait time is much less for courses that are offered more frequently. All employees interviewed stated that they eventually received the training they needed.

found it necessary to obtain a waiver for required training in order to appear before their qualification boards as scheduled.

Regional personnel noted that they often spend a significant amount of time coordinating and negotiating with HRTD staff to get individual employees enrolled in needed training courses. As NRC continues to grow, it may become more difficult to use these informal methods to ensure employees get the training they need.

### **RECOMMENDATIONS:**

We recommend that the Executive Director for Operations:

6. Form a working group of select representatives from the program offices, regional offices, and HRTD to conduct a thorough review of the training calendar including location and frequency of courses, travel costs, and opportunities for efficiencies in course sequencing (i.e., course bundling). The group should identify problems and develop mutually agreed-upon solutions within the constraints of contractual agreements, budgets, and resources.
7. Within contractual limitations, identify and schedule courses at the same time each year so employees can anticipate the availability of courses. Communicate these courses and dates widely to make sure employees, supervisors, training coordinators, and managers are aware of the annual schedule.
8. Before implementing the enforcement of course prerequisites in the Learning Management System:
  - a. Determine the impact on employees' ability to take all required training within the allotted timeframe.
  - b. Communicate the change to NRC personnel in advance and allow opportunities for feedback.

### **3.3 Performance Metrics**

To show its value to the organization, the Training and Development Program must show how its training solutions link to strategic outcomes and if the solutions justify the

cost. HRTD's current performance metrics fail to provide meaningful insight into how its programs align with the agency's mission and strategic goals, or demonstrate training efficiency and effectiveness. HRTD has encountered challenges in producing credible, reliable, and consistent performance measures. Without effective performance metrics, HRTD is unable to demonstrate its contribution to NRC's mission and risks future support and funding.

3.3.1 In order to show value to the organization, the Training and Development Program must show how its training solutions link to strategic outcomes and if the solutions justify the cost.

Government agencies and the programs they offer are increasingly being called upon to prove their impact in order to justify their budgets. The President's Management Agenda places increasing emphasis on accountability and demonstrating performance. "Over time, agencies will be expected to identify high quality outcome measures, accurately monitor the performance of programs, and begin integrating this presentation with associated cost."<sup>25</sup>

NRC has recognized the growing trend in Government accountability and, as a result, included an operational excellence strategy for strengthening accountability for setting and achieving individual and organizational performance expectations in its 2008-2013 Strategic Plan.<sup>26</sup> The agency identified the need to, "...incorporate effectiveness and efficiency measures in the NRC planning and performance measurement process throughout the agency."<sup>27</sup>

In this environment of increasing accountability, Government decision makers and agency leaders are placing more emphasis on the need to demonstrate results achieved through the significant investments devoted to training and developing employees. Training and development programs are finding it more important to show

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<sup>25</sup> United States, Office of the President, President's Management Agenda, (Washington: 2002) 29.

<sup>26</sup> United States, Nuclear Regulatory Commission, Strategic Plan Fiscal Years 2008-2013 (2007) 20.

<sup>27</sup> Strategic Plan Fiscal Years 2004-2009, 18.

their value to the organization by demonstrating how their offerings help the agency achieve its strategic objectives. The *GAO Guide for Strategic Training and Development Efforts* emphasizes the importance of aligning training investments with the agency's strategic goals. The United States Government Accountability Office (GAO) says there needs to be a direct link between the training courses and the skills and competencies identified by the agency for mission accomplishment.<sup>28</sup> NRC has already established this direct link between training and competency development by stating in its Strategic Plan that the agency, "...will maintain a dynamic program of training, development, and knowledge transfer to ensure that the NRC acquires and maintains the competencies needed to implement the strategic plan."<sup>29</sup>

The way to ensure accountability and evaluate progress toward achieving results aligned with the agency's mission and goals is through effective performance measures. However, measuring the effectiveness of training and development programs can be complicated and challenging. As a result, many organizations have limited their measures of effectiveness to factors they can easily quantify, such as number of courses offered, number of employees attending training, total training hours, employee satisfaction with training, and exam results. While all of these input/output metrics are necessary and valuable, they do not show how training and development contributes to improved performance, reduced costs, and the ability to accomplish the agency's mission.<sup>30</sup>

In order to measure the real impact of training, agencies need to move beyond data that merely measures inputs and outputs. They need to develop performance metrics that show how training and development programs contribute to accomplishing agency goals and objectives. Outcome based performance measures focus on:

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<sup>28</sup> United States, Government Accountability Office, *A Guide for Assessing Strategic Training and Development Efforts in the Federal Government*, March 2004, 13.

<sup>29</sup> *Strategic Plan Fiscal Years 2004-2009*, 20.

<sup>30</sup> *A Guide for Assessing Strategic Training and Development Efforts in the Federal Government*, 60.

- How training and development programs contribute to improved organizational and programmatic results; often measured through the attainment of competencies necessary for the agency to be successful.<sup>31</sup>
- How the investment in training programs is justified based on the outcomes; often measured through the identification of expenses associated with all components of the training and development processes.<sup>32</sup>
- How individual training courses contribute to performance improvement; often measured through course evaluation strategies and tools.

HRTD has identified the need to improve its performance metrics, as stated in the Training and Development Strategic Plan. “The agency will explore ways to improve performance measures and metrics focusing on the training and development programs’ contributions to individual and organizational performance.”<sup>33</sup>

3.3.2 Current performance metrics fail to provide meaningful insight into how HRTD training and development programs align with NRC’s mission and strategic goals or demonstrate training efficiency or effectiveness.

HRTD’s current performance metrics focus primarily on attendance, student satisfaction, and test scores. Current measures reported quarterly in HRTD’s Office Operating Plan include the following:

- Average hours of training per employee.
- Percentage of staff completing a minimum of 24 hours of training.
- Percentage of staff recording no training activity.

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<sup>31</sup> A Guide for Assessing Strategic Training and Development Efforts in the Federal Government, 30.

<sup>32</sup> A Guide for Assessing Strategic Training and Development Efforts in the Federal Government, 71.

<sup>33</sup> Training & Development Strategic Plan, 9.

- Number of training no shows.
- Number of course per year cancelled or unable to be scheduled when needed due to training infrastructure support problems.
- Percent of professional development programs participants, supervisors, and senior advisors that responded positively to program evaluations that program objectives were met.
- Percentage of students that attain a passing score on course exams.
- Percentage of attendees that rate training satisfactory or better on student evaluation forms.<sup>34</sup>

HRTD has encountered difficulties accurately collecting and reporting the above performance data since they have to collect much of it manually. Managers and supervisors stated that they found training completion information to be inaccurate or not current in the Human Resources Management System (HRMS) and thus rely on their own “home-grown” reports to maintain training information. In addition, HRTD instructors use various manual methods for tracking student satisfaction and exam scores.

While the metrics listed above provide valuable output measures, they do not effectively show the actual business impact of the training interventions. HRTD collects, tracks, and reports limited data to show:

- **How training courses are helping employees attain competencies.** Through its Strategic Workforce Planning (SWP) process, NRC has identified the competencies/skills necessary for the agency to accomplish its mission, as well as anticipated critical gaps in the skills needed for the agency to continue to meet

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<sup>34</sup> United States, Nuclear Regulatory Commission, Human Resources Office Operating Plan, Quarterly Measurements, 2008 – Quarter 2.

its goals. NRC has stated that it relies on two primary methods to fill its critical skill gaps: (1) recruiting and hiring and (2) training and development.<sup>35</sup>

However, HRTD does not have a method to show it is developing and offering training that helps fill critical skills gaps. While HRTD conducts an annual training needs assessment to determine which courses should be offered each year, the assessment is not linked to the SWP process. HRTD has not effectively linked investments in training and development programs to gaps identified through SWP. Although employees are required to self report their competencies into NRC's SWP tool, supervisors and managers stated that they make limited use of the tool to identify training needs to fill critical skill gaps.

Further, HRTD does not have the ability to demonstrate how its training programs help the agency maintain the identified competencies and fill the critical skill gaps. It has not assessed its training courses to determine which, if any, identified competencies each course teaches. One advantage associated with linking training to competencies is the ability to demonstrate the strategic value of training.<sup>36</sup>

The Training and Development Strategic Plan states that HRTD will take action to "...more comprehensively define competencies and training needs for major functions or groups of like positions; and better integrate its training and development programs with performance elements and standards, position descriptions, training needs surveys, and the strategic workforce planning system."<sup>37</sup> However, HRTD has not yet taken the steps to achieve these objectives.

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<sup>35</sup> United States, Government Accountability Office, Retirements and Anticipated New Reactor Applications will Challenge NRC's Workforce, January 2007, 11.

<sup>36</sup> Davis Dubois and William Rothwell, "Competency-based or a Traditional Approach to Training?" Training & Development, April 2004, 44- 56.

<sup>37</sup> Training and Development Strategic Plan, 3.



- **How investments in training programs are justified based on the outcomes.** Although the Training and Development Strategic Plan states that HRTD, "...will use budget planning and execution processes and the time and labor system to capture and track agency wide expenditures for conducting and attending training,"<sup>38</sup> HRTD has not established a means to effectively and consistently track training costs beyond the cost of contracted courses or external training events. Without a full understanding of the cost of internal training, HRTD is unable to effectively compare the costs of internal and external resources, or to show its programs are providing a return on the agency's investments in training.
- **How individual training courses are helping improve performance.** While HRTD administers an exam at the end of many courses to show learning has taken place, it does not conduct other forms of evaluation to show if performance is improved. Performance metrics associated with training evaluation strategies are addressed in more detail in Section 3.4.

While the performance measures discussed above are not an exhaustive list of possible training and development metrics, they represent areas that GAO has recognized as important to showing the effectiveness of training programs. These performance measures are also widely used by organizations today to show the impact of training and development on results.<sup>39</sup> Using metrics similar to those tracked by other organizations will allow NRC to more easily compare and benchmark its training and development programs against others.

HRTD is currently reexamining its performance metrics to better measure training effectiveness. The implementation of the new LMS, launched in April 2008, has the potential to aid in the collection of performance data. In the first phase of the LMS deployment, HRTD focused on course registration, tracking, and scheduling capabilities. However, the system has extensive capabilities for recording, tracking, and

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<sup>38</sup> Training and Development Strategic Plan, 8.

<sup>39</sup> Andrew Paradise, "2007 State of the Industry Report," American Society for Training and Development, 2007, 6-21.

reporting performance data. One of the benefits of the LMS is that it will be NRC's single system of record for training, thus allowing HRTD to leverage its capabilities to capture training metrics.

3.3.3 HRTD faces challenges collecting and reporting credible, reliable, and consistent performance data to demonstrate the effectiveness of its training and development program.

In the past, HRTD has encountered obstacles in collecting and reporting accurate performance data, as mentioned above. Much of the data has been collected manually and in different systems, e.g., students provide course feedback in hardcopy format which instructors enter manually into different and independent spreadsheet tracking forms. Some of the data has been incomplete and/or inaccurate, e.g., employee training records in the HRMS often provide an incomplete picture of individual training completions. As a result, data collection, analysis, and reporting have been time consuming and labor intensive. HRTD has necessarily focused on collecting performance data that is easily quantifiable and accessible such as attendance, satisfaction, and exam scores.

Now that HRTD has a more efficient means to collect, track, and report performance data through the LMS, current performance metrics need to be refined to allow HRTD to better demonstrate how its programs contribute to agency success. However, the LMS is a means to an end, not the entire solution. In order for the LMS to aid HRTD in the collection, analysis, and reporting of meaningful performance metrics, the organization must:

- Choose performance metrics that demonstrate mission alignment, track training costs, and demonstrate effectiveness and efficiency.
- Evaluate the LMS' capabilities for collecting performance data in support of the new metrics.

The LMS chosen by NRC has extensive capabilities and can assist HRTD in collecting data in support of the three outcome-based measures discussed above: demonstrating how training programs contribute to results (linking training to competency development), justifying training expenditures based on outcomes, and linking training to performance improvement.

First, the LMS has the ability to link training and competencies, but HRTD does not currently subscribe to this feature. In order to implement the competency model capabilities, HRTD would need to assess all of its courses to identify the associated competencies, evaluate the LMS capabilities for determine if they meet the agency's needs, and develop a business case to support the purchase of the capability.

Secondly, the LMS has extensive cost tracking capabilities that will help HRTD demonstrate the efficiency of its operations. HRTD is able to track some costs with the currently deployed capabilities, but may have to purchase additional capabilities, depending on the measures it chooses to track. Typical training cost measures employed by member organizations of the American Society for Training and Development (ASTD) include:<sup>40</sup>

- Direct expenditure per employee.
- Direct expenditure as a percentage of payroll.
- Percent of expenditure for tuition reimbursement.
- Cost per learning hour used.
- Travel and accommodation costs.
- Cost of work time lost during training.
- Percentage of learning expenditure for tuition reimbursement.

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<sup>40</sup> Paradise, 6-17.

- Cost savings realized through outsourcing learning initiatives.
- Content development costs.

Finally, the LMS has the ability to collect evaluation data as suggested in Section 3.4 of this report. Using the LMS for the collection of evaluations at all levels aids in consistency and efficiency while allowing for increased data collection with minimal effort.

3.3.4 Without effective performance metrics, HRTD is limited in its ability to demonstrate its contribution to NRC's mission and risks future funding.

While NRC's Training and Development Program has been well-funded to date,<sup>41</sup> the increasing emphasis on accountability in the Federal Government may make future funding less certain. NRC invests a significant amount of money and resources in training and developing employees, but may not be able to measure the business outcomes and results it is getting for its investment. Without a direct link between results and investments, training programs can begin to look like an unjustified cost, resulting in a decline in both support and funding.<sup>42</sup> The inability to show measurable results can result in budget cuts.

With accurate and effective performance measures, on the other hand, organizations can make better decisions about whether to revise or redesign training programs or eliminate ineffective programs. Good performance metrics can also be used to make decisions about future programs including the most effective delivery mechanisms and barriers to improved performance.<sup>43</sup> As the President's Management Agenda directs,

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<sup>41</sup> HRTD's Deputy Associate Director stated that the Training and Development Program often has excess funds at the end of the fiscal year.

<sup>42</sup> Steve Wexler, et al., "Measuring Success: Aligning Learning Success with Business Success," The e-Learning Guild, (October 2007) 204.

<sup>43</sup> A Guide for Assessing Strategic Training and Development Efforts in the Federal Government, 61.

performance measures can be used to reinforce high performing programs and reform or end non-performing programs.<sup>44</sup>

### **RECOMMENDATIONS:**

We recommend that the Executive Director for Operations:

9. Develop and implement new performance metrics to demonstrate mission alignment, effectiveness, and efficiency.
10. Develop and implement a plan to leverage the capabilities of the LMS for collection and reporting of chosen metrics. Specifically, evaluate the competency model capabilities to determine if they meet NRC's needs, including identifying competencies, linking courses (or course modules and learning objectives) to identified competencies and closing critical skill gaps.
11. Develop and implement a comprehensive cost tracking capability (including cost data for each course) to determine the most economical and efficient method to meet NRC's training needs.

### **3.4 Evaluation Strategies**

A systematic evaluation approach and process allows for continuous improvement within the training function when aligned with organizational goals. NRC does not use a systematic evaluation process for continuously improving its training and development program because it has not:

- Developed a strategy for collecting pertinent evaluation data.
- Finalized the draft evaluation procedure.
- Evaluated the current LMS capability for data collection.

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<sup>44</sup> President's Management Agenda, 29.

Without a strategy that standardizes the training evaluation procedure and metrics, NRC cannot accurately measure and monitor its achievement of goals.

3.4.1 A systematic evaluation approach and process allows for continuous improvement in the learning and development function by enabling data-driven decisionmaking.

Agencies are finding it increasingly important to evaluate their training and development programs and demonstrate how these efforts help develop employees and improve the agencies' performance. HRTD has recognized the value of evaluation and includes a strategy to, "...implement meaningful evaluation tools and performance measures to assess progress toward achieving results aligned with the agency's mission and goals" in the Training and Development Strategic Plan.<sup>45</sup>

The Training and Development Strategic Plan also states, "...the training organization will evaluate stakeholder input and feedback mechanisms for training and development programs to determine whether additional levels of evaluation are necessary and cost-effective to ensure quality and results. Increased use of higher level evaluations would require cooperation, input, and resource expenditure from all training stakeholders including attendees, supervisors, and managers."<sup>46</sup>

In the statement above, HRTD is alluding to Kirkpatrick's Four-Level Evaluation Model<sup>47</sup> which it references in the evaluation of NRC training programs. This model is probably the best-known and most widely used training evaluation methodology. The four levels measure:

- Reaction of students to the training; usually collected through student feedback forms (Level 1).

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<sup>45</sup> Training and Development Strategic Plan, 8.

<sup>46</sup> Training and Development Strategic Plan, 9.

<sup>47</sup> Donald Kirkpatrick, *Evaluating Training Programs* (San Francisco: Berrett-Koehler Publishers, Inc, 1994).

- Amount of learning that took place; often determined by testing students (Level 2).
- Change in performance; often determined by supervisor input (Level 3).
- Impact on the organization; determined by various measures such as increase in sales or reduction in errors (Level 4).

Jack Phillips Return on Investment (ROI) methodology has often been combined with Kirkpatrick’s model to produce a fifth level of evaluation.<sup>48</sup> Level 5 measures if the organization is reaping a value from the training program that is equal to or greater than their investment costs. Additional information about these levels can be found in Appendix A.4.

In the Federal Government’s *Guide for Assessing Strategic Training and Development Efforts in the Federal Government*, the GAO notes that not all programs necessitate, or are appropriate for, higher levels of evaluation. The GAO uses the figure below to suggest the percentages of total courses that should be evaluated at each level. Best-practice organizations usually target 100 percent of all training programs to be evaluated at the reaction level (Level 1) and conclude with targets of 5 to 10 percent of training programs to be evaluated at the return on investment level (Level 5).<sup>49</sup>

<b><u>Evaluation Level</u></b>	<b><u>Recommended Percentage of Training Programs To be Measured at Each Level</u></b>
Level 1 - reaction	100% of training programs
Level 2 - learning	60% of training programs
Level 3 - performance	30% of training programs
Level 4 - impact	10% of training programs
Level 5 - return on investment	5% of training programs

<sup>48</sup> Jack Phillips, *Return on Investment in Training and Performance Improvement Programs*. (Houston: Gulf Publishing Company, Houston, 1997).

<sup>49</sup> *A Guide for Assessing Strategic Training and Development Efforts in the Federal Government*, 63.

#### Figure 3.4.1.1 Evaluation Targets for Training Programs

Nearly 96 percent of the 2004 Training Magazine Top 100 companies measure some training effectiveness through Level 4 and 75 percent of the companies measure through Level 5.<sup>50</sup> A research study by the eLearning Guild found no significant relationship between the size of a training budget and usage of Levels 3 and 4 evaluations. However, the study did find a significant relationship between the need for a knowledgeable and skilled work force and usage of Levels 3 and 4. The findings also show that as this factor increases in importance for an organization, so too does its usage of Kirkpatrick Levels 3 and 4.<sup>51</sup>

3.4.2 HRTD has not implemented a systematic evaluation strategy or procedure to evaluate the impact of training and development programs.

Although HRTD uses parts of the Kirkpatrick model, the organization has not fully developed and implemented an evaluation strategy or procedure at all levels. NRC currently collects Level 1 data with its student feedback form for all courses delivered by HRTD or its contractors. However, HRTD uses several different forms to collect student feedback.<sup>52</sup> Level 2 evaluations, in the form of performance-based tests, are being conducted for some courses, most often for the technical courses. HRTD has attempted to collect Level 3 evaluation data from supervisors in the past to determine if employee performance improved following a course. Concerns about the low level of participation from supervisors and managers led to questions about the data's validity and usefulness. Level 4 and 5 evaluations have not been conducted systematically although information is gathered from division directors informally about whether training has met their needs and provided value for the money.

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<sup>50</sup> Tammy Galvin, "The 2004 Top 100," Training Magazine 01 April 2004, 32.

<sup>51</sup> Joe Pulichino, "Usage and Value of Kirkpatrick's Four Levels of Training Evaluation Research Report," The eLearning Guild, August 11, 2006, 27.

<sup>52</sup> The OIG recommended in OIG-07-A-05, "Audit of NRC's Technical Training Facility," (January 2007) that HRTD develop one consistent form to evaluate all training programs.



Most Level 1 evaluation data is collected manually at present. Some instructors track student feedback data, but the data is kept in multiple spreadsheet programs. Most stated that they read portions of the form and then file them away. In some instances, the form is reviewed by a supervisor who identifies any needed changes. The only information from the student feedback form that HRTD tracks consistently across the PDC and TTC is the overall satisfaction rating that students assign to the courses. HRTD has refrained from collecting additional types of data and conducting data analysis because it viewed the process as time consuming and resource intensive. HRTD has been unsure of the benefits that could be gained and hesitant to dedicate resources to a systematic evaluation strategy addressing multiple levels.

HRTD is in the process of drafting a new procedure, Operating Procedure 410, to address its evaluation process. The draft procedure currently outlines the processes for:

- Reviewing, summarizing and reporting student feedback data (Level 1).
- Evaluating the validity of student examinations (Level 2).
- Evaluating instructors in the classroom.

While Operating Procedure 410 addresses the step-by-step procedure for collecting Level 1 and Level 2 data, it does not provide an overall strategy for collecting meaningful evaluation data that shows how training programs are contributing to improved performance and accomplishing the agency's mission.

3.4.3 HRTD's evaluation efforts are hampered by the lack of a defined evaluation strategy, evaluation procedure, and automated data collection methods.

NRC does not use a systematic evaluation procedure partially because it has not finalized HRTD Operating Procedure 410. The current draft of the procedure includes methods for evaluations at Level 1 (student feedback forms) and Level 2 (course

examinations), but does not address any higher levels of evaluation as defined by Kirkpatrick's model.

Level 1 evaluation data (students' reactions) can be useful in determining which instructors, training methods, aids, and resources are popular and, therefore, likely to affect trainee motivation and participation. However, data from student feedback forms does not indicate whether the training program contributed to achieving the goals and objectives of the organization. It cannot show if participants successfully transferred knowledge gained from the course to their on-the-job performance. Involving stakeholders, who are in a position to observe behavioral or organizational changes, provides a much better indicator of the impact of training. Potential sources of data about performance improvement opportunities are the qualification boards and focus groups with supervisors and managers.

HRTD has not defined a strategy for collecting evaluation data at levels beyond 1 and 2. NRC would benefit from developing an evaluation strategy that describes the organizational goals that must be supported and the types of evaluation that will be implemented to ensure that these goals are being met. Aligning the HRTD evaluation strategy with organizational goals will allow NRC to determine what activities have the most significant business impact and should therefore receive more resources and which do not have business impact and should therefore receive fewer resources or be adjusted to increase their impact. NRC will also gain important insights about how well their new employees are transferring knowledge gained from the courses to their on-the-job performance and whether improvements are necessary.

While past data collection methods have been fragmented, the implementation of the new LMS provides HRTD with the opportunity to automate much of the data collection, thus reducing the burden placed on staff to manually collect and analyze data. Although the LMS is capable of collecting large amounts and varying kinds of data, these additional capabilities can be costly. The selection of capabilities should be

guided by an evaluation strategy that defines the type of data HRTD needs to demonstrate how its programs contribute to the success of NRC.

3.4.4 Without a strategy that standardizes the training evaluation procedure and metrics, NRC can not accurately measure and monitor its achievement of goals.

The need for evaluation at all levels is to provide a holistic picture of how training contributes to organizational objectives. GAO acknowledges that agencies are finding it increasingly important to demonstrate how their training and development efforts are helping develop employees and improve performance. As the Federal Government moves toward linking resources with results, they are focusing on training and development efforts along with other agency programs.<sup>53</sup>

Without an evaluation strategy and a means to collect meaningful data, HRTD is not able to effectively demonstrate how training and development programs contribute to NRC's success.

**RECOMMENDATIONS:**

We recommend that the Executive Director for Operations:

12. Finalize Operating Procedure 410 including a new standardized student feedback form.
13. Develop an evaluation strategy plan that defines the data HRTD needs to collect at varying levels to demonstrate the impact of its programs on the agency.
14. Evaluate the capability for collecting evaluation data via the Learning Management System.
  - a. If the Learning Management System's capabilities meet the agency's needs, develop a business case for purchase and deployment of additional capabilities.

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<sup>53</sup> A Guide for Assessing Strategic Training and Development Efforts in the Federal Government, 8.

- b. If the Learning Management System's capabilities do not meet the agency's needs, develop a plan for using alternative technologies to collect and analyze evaluation data.

### **3.5 Alternative Delivery Mechanisms for Training**

NRC is facing workforce challenges that make e-learning a viable alternative to the traditional classroom, which is currently used for the majority of courses. HRTD has recognized the benefit that new training methodologies could bring to the agency and has deployed a new LMS to enable e-learning. However, HRTD has not developed an e-learning strategy or implementation plan to maximize the benefits of this investment and ensure it is helping HRTD meet the agency's most pressing training needs. HRTD staff is strained to meet all of the training needs in the traditional classroom with its current staff and facility resources, but additional funding to support e-learning initiatives may be difficult to obtain without a defined strategy and implementation plan.

#### **3.5.1 NRC is facing challenges that make e-learning a viable alternative to the traditional classroom.**

GAO has estimated that approximately one-third of NRC's highly skilled employees will be eligible to retire by 2010. At the same time, NRC's workforce is expanding to handle the anticipated increase in applications for new nuclear power reactors.<sup>54</sup> These factors along with the development of new technologies, the need to train Agreement State personnel<sup>55</sup> and other challenges outlined previously in this report have increased the need for training at NRC. At the same time, the agency is placing a greater emphasis on telecommuting as a retention strategy, is hiring an increasingly younger population, and has a significant number of employees located at offsite locations.<sup>56</sup> Organizations

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<sup>54</sup> Retirements and Anticipated New Reactor Applications will Challenge NRC's Workforce, 31.

<sup>55</sup> In 2007, NRC made their training programs available at no cost to personnel in the 34 Agreement States. NRC pays for all travel and per diem costs for Agreement State personnel to attend NRC training programs.

<sup>56</sup> FY 2004-2009 Strategic Human Capital and Workforce Restructuring Plan, 1-7.

facing similar challenges have looked to innovative training delivery methods to supplement their classroom training.

In the Training and Development Strategic Plan, HRTD has identified the need to, "...evaluate and apply current and emerging learning tools and methodologies, as appropriate, to reduce time and travel costs for attending classroom training."<sup>57</sup> They have noted that other training delivery mechanisms such as self-study, computer-based programs, blended learning, or on-the-job training may meet employee needs more conveniently, efficiently, and effectively. The NRC 2004-2009 Strategic Human Capital and Workforce Restructuring Plan also addresses the need to "...develop and implement e-learning strategies to provide effective training at lower cost."<sup>58</sup>

e-Learning has been defined as, "...the use of internet technologies to deliver a broad array of solutions that enhances knowledge and performance."<sup>59</sup> It has become a mainstream delivery method as virtual classrooms and online self-study courses now account for nearly one-third of all formal training hours consumed by students. While approximately 65 percent of formal training is still delivered in the classroom by an instructor, this number has decreased significantly over the past ten years.<sup>60</sup> ASTD has observed a higher ratio of employees to training staff than in previous years because of efficiencies gained from technology-based learning solutions.<sup>61</sup>

Research has shown that successful e-learning implementations are guided by an effective e-learning strategy that contributes to the overall vision and mission of the organization. The primary component of an e-learning strategy is a set of goals or objectives that need to be achieved with e-learning. These goals and objectives need

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<sup>57</sup> Training and Development Strategic Plan, 5-7.

<sup>58</sup> FY 2004-2009 Strategic Human Capital and Workforce Restructuring Plan, 11.

<sup>59</sup> Marc Rosenberg. e-Learning: Strategies for Delivering Knowledge in the Digital Age. (New York: McGraw-Hill, 2001), 28.

<sup>60</sup> Karen O'Leonard. "The Corporate Learning Factbook © 2008," Bersin & Associates, January 2008, 10.

<sup>61</sup> Paradise, 4.

to be aligned with the mission and vision of the organization.<sup>62</sup> When e-learning initiatives are not closely aligned, they can lead to inappropriate, or even damaging, results.<sup>63</sup> Alignment ensures e-learning is linked to the attainment of organizational objectives and prevents the implementation of solutions for problems that don't even exist. According to the eLearning Guild, a strategy must accompany the tactics of implementing e-learning to avoid a lot of wasted activity that yields little value to the organization, misses opportunities, and depletes goodwill.<sup>64</sup>

While the e-learning strategy addresses the goals the organization would like to realize in 3-5 years, an implementation plan provides the tactical steps the organization will take within the next 12 months to achieve the long-term e-learning goals. In other words, the strategy defines "what" and the implementation plan spells out "how." An implementation plan also includes associated milestones and measures of success. e-Learning implementation plans focus on the people, process, and technology issues that must be addressed for a successful execution. Appendix A.3 includes a list of considerations in each of these areas for possible inclusion in an e-learning implementation plan.

3.5.2 Although HRTD has deployed a new Learning Management System and some courses have been developed for online delivery, HRTD has not developed a complete strategy or implementation plan for e-learning.

HRTD currently offers approximately 30 online courses, and it recently deployed a new LMS. The initial LMS implementation was focused on centralizing and standardizing enrollment and tracking of students along with classroom and resource management. HRTD has noted in its Strategic Plan that it intends to implement additional functions in the LMS including the incorporation of Individual Development Plans (IDPs) and qualification templates; increased planning, tracking and reporting tools for employees

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<sup>62</sup> Jennifer De Vries. "e-Learning Strategy: A Framework for Success," ASTD's Learning Circuits, August, 2005. <http://www.learningcircuits.org/2005/aug2005/devries.htm>.

<sup>63</sup> Ryan Watkins and Roger Kaufman, "Strategic Planning for Distance Education," Handbook of American Distance Education, ed. Mark Moore (Mahwah, NJ: Lawrence Erlbaum Associates, 2003), 509.

<sup>64</sup> Brandon, 3.

and supervisors; and access to online training opportunities.<sup>65</sup> HRTD staff members have suggested that the LMS can also be used to accomplish other objectives in the Training and Development Strategic Plan, including the linking of training programs to job competencies/critical skills and the Strategic Workforce Planning tool. Many of HRTD's plans for the LMS are in line with GAO's recommendation that training and development organizations should have a comprehensive LMS that can "...track the delivery of training, as well as, accounting, financial, and performance reporting systems that produce credible, reliable and consistent data on training and development programs."<sup>66</sup>

Like many organizations new to e-learning, HRTD has focused much of its efforts on the technology to enable alternative delivery means. HRTD's e-Learning Plan, developed in 2005, focuses mainly on the tactical issues of implementing technology and deploying courses. While the HRTD Training and Development Strategic Plan shows linkages to the agency's vision and mission, e-learning needs to be fully integrated in order to show the same linkages. An e-learning strategy would help to align learning investments directly to business results while providing metrics to measure the value of those learning investments.

While the current e-Learning Plan addresses the initial phases of LMS deployment and selection of commercial off-the-shelf (COTS) courses, it does not address the ongoing implementation of the e-learning strategy to include the additional capabilities mentioned in the Training and Development Strategic Plan. The deployment of the LMS provides HRTD with the foundational building block that will allow it to develop a robust e-learning program, but it does not have a clearly defined path for a full e-learning implementation that helps achieve its strategic learning goals.

The plan includes some of the elements of an effective implementation plan listed in Appendix A.1 (e.g., the need for a change management and communications plan,

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<sup>65</sup> Training and Development Strategic Plan, 5.

<sup>66</sup> A Guide for Assessing Strategic Training and Development Efforts in the Federal Government, 71.

need for user support), but the plan is incomplete and does not contain specific strategies and current milestones for implementation. It does not include a governance plan although some staff members suggested that input from an advisory board has been very beneficial in the past and they would like to see such a board reinstated. In addition, some of the implementation strategies included in the plan have not been very effective. For example, several of the communication methods described in the plan was used in conjunction with the recent roll-out of the LMS, but staff members stated the marketing and communications plan was not completely effective and resulted in initial difficulties in using the system.

In summary, the current NRC e-Learning Plan contains elements of both an e-learning strategy and an implementation plan, but neither the strategy nor the plan are complete. HRTD staff members have stated that the Plan needs to be updated since the roll-out of the LMS because the milestones are three years old and are no longer applicable. When the plan is updated, the HRTD staff should take the opportunity to better define their e-learning strategy and implementation plan.

3.5.3 HRTD staff is strained to meet all of NRC's training needs in the traditional classroom with its current staff and facility resources, but additional funding to support e-learning initiatives may be difficult to support without a defined strategy and implementation plan.

The majority of HRTD courses are currently delivered in the classroom by an instructor. According to The Sloan Consortium, approximately 34 percent of all graduate school courses were offered online in 2006 representing a 20 percent increase since 2002. In addition, almost 70 percent of the postsecondary institutions included in the study agreed that student demand for online learning is growing.<sup>67</sup> HRTD management, as well as instructors at both PDC and TTC, stated that they do not have enough

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<sup>67</sup> I. Elaine Allen and Jeff Seaman, "Online Nation: Five Years of Growth in Online Learning," The Sloan Consortium and Babson Survey Research Group, (October 2007), 10-15.



instructors and classrooms to meet current training needs and are concerned about how they are going to meet the increasing needs.

The increasing need for training may not be a short-term surge, but may continue beyond NRC's current step-up in hiring to handle the new licensing requirements. While NRC has benefited from low turnover and a high degree of loyalty in its aging workforce, the agency may find a different mindset among the younger employees they are now recruiting. Continuing turnover in the employee population will necessitate a continuing need for training at higher volumes than HRTD has historically experienced.

3.5.4 Additional funding to support e-learning initiatives may be difficult to obtain without a defined strategy and implementation plan.

While NRC has an increasing need to explore alternative methods for delivering training, HRTD may find it difficult to get and keep support and funding for e-learning initiatives if they cannot clearly link these initiatives to the strategic goals of the agency and they do not have a well-defined roadmap for implementing the program.<sup>68</sup>

#### **RECOMMENDATIONS:**

We recommend that the Executive Director for Operations:

15. Develop an e-learning strategy that establishes a broad, fundamental connection between e-learning and organizational mission, strategy, business objectives, and performance improvement.
16. Develop an implementation plan for e-learning that includes, at a minimum:
  - a. An assessment of NRC's baseline technology.
  - b. A plan for roll-out, implementation, maintenance, and ongoing evaluation of additional Learning Management Systems capabilities. The implementation plan should include a cost/benefit analysis of the available LMS features and how they can support NRC's business needs.

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<sup>68</sup> Brandon, 7.

### 3.6 Staff Skill Sets

Organizations that have implemented e-learning solutions have found the skills needed to develop technology-enabled learning are very different from those needed for classroom instruction. Staff in HRTD noted that there are limited skills and resources for the development and deployment of e-learning among the current staff. If NRC plans to implement more e-learning solutions, HRTD will need to find ways to close the e-learning skill gaps—either through training, hiring, or outsourcing. Attempting to develop effective e-learning programs without the necessary skills can lead to frustration for the staff and ineffective learning opportunities for employees.

3.6.1 The skills and roles needed to implement e-learning are very different from the skills and roles used for classroom instruction.

In 1995, Thach and Murphy identified thirteen roles necessary for the design and delivery of e-learning.<sup>69</sup> While their work is still relevant, the field has evolved since their study thirteen years ago. The table below shows the thirteen roles identified by Thach and Murphy along with updates to reflect more typical e-learning project roles of today.

Role	Description
<b>Instructional Designer</b>	Work with instructors and/or subject matter experts to design courses, revise existing courses to fit distance learning environment. Must be familiar with designing for e-learning standards and regulations.
<b>Programmer</b>	Work closely with instructional designer to select best technology solution for learning objectives, assess, and implement new technologies as needed to support e-learning, and ensure compliance with e-learning standards and regulations.

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<sup>69</sup> Elizabeth C. Thach and Karen L. Murphy. "Competencies for Distance Education Professionals," Educational Technology Research and Development March 1995: 57-71.

<b>Subject Matter Expert</b>	Provide content matter expertise to design team, review content to ensure integrity, and provide content updates to design team as necessary to keep course content current.
<b>Graphic Designer</b>	Design attractive, clear layout, and ensure materials facilitate learning.
<b>Project Manager</b>	Manage staff and operations, monitor timelines, and ensure quality.
<b>Instructor (for certain types of online courses)</b>	Facilitates course delivery, monitors and evaluates learner performance. In some instances, the instructor may also serve as Subject Matter Expert.
<b>Systems Administrator</b>	Advise in selection of distance learning technology, ensure reliability of technology, and assess future changes in technology. Primary interface with IT department to ensure e-learning technology operates within the enterprise network.
<b>Technician/Help Desk Staff</b>	Keep equipment in running condition, respond to users' questions and problems, and assist instructors with technical delivery of courses.
<b>Site Facilitator</b>	Assist students in learning at remote sites, distribute/collect materials/assignments, proctor tests.
<b>Support Staff</b>	Register students, communicate course schedule/descriptions, and coordinate support services.
<b>Editor</b>	Edit course content for style, clarity, grammar, and structure. Must be skilled in web writing styles.
<b>Librarian/Knowledge Management</b>	Collect and organize the knowledge assets of the organization; provide means for students to find and use these knowledge assets. May also assist with copyright and digital rights issues.
<b>Evaluation Specialist</b>	Provide tools and evaluation instruments, monitor program success/problems, consult instructor about evaluation.

Table 3.6.1.1 Summary of e-learning roles adapted from Thach & Murphy (1995: p. 67-69).

While some of these roles are primary in an e-learning project, others play a supporting role. Using these roles as a guideline, e-learning leaders need to assess the current

skills of their training professionals to identify any gaps and then develop a strategy for closing those gaps—through training, hiring, or outsourcing.<sup>70</sup>

Having the right internal resources with the right skills and experience is vital to a successful e-learning implementation.<sup>71</sup> A recent Bersin Report notes that organizations once heavily staffed with instructors are now hiring higher proportions of content developers and technology specialists to facilitate their online learning strategies. They have found that these roles come at a lower cost than a senior trainer or instructor.<sup>72</sup> Bersin and Associates have also noted that highly effective training organizations are directing more staff resources toward technology, analytics and measurement, and content development for e-learning and fewer resources to administration and content development for instructor-led training.<sup>73</sup>

3.6.2 While the HRTD staff has successfully designed and delivered classroom instruction for many years, few instructors have skills and experience in the design, development, and delivery of e-learning programs.

Training programs offered by HRTD are developed and delivered by HRTD staff or by contractors. In general, the training staff at the TTC is composed of technical experts in the fields of health physics, reactor technologies, or other nuclear related areas. These technical experts are responsible for designing and delivering training and may, in some instances, oversee the design and delivery of training by contracted staff. The majority of the training staff at the PDC generally act as project managers, overseeing the design and delivery of courses by contractors.<sup>74</sup> Some have received training in the

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<sup>70</sup> Gustavo Pretera and Leslie Moller. "Organizational Alignment Supporting Distance Education in Post-secondary Institutions," Online Journal of Distance Learning Administration, Winter 2001, <http://www.westga.edu/~distance/ojdl/winter44/pretera44.html>.

<sup>71</sup> Lori Mortimer. "e-Learning 101: The Devil is in the Details," ASTD Learning Circuits. December, 2001.

<sup>72</sup> O'Leonard, 9.

<sup>73</sup> Bersin & Associates, The High Impact Learning Organization: What Works in the Management, Operations and Governance of Corporate Training, June 2005, 85.

<sup>74</sup> These statements are general observations and do not describe the skill sets of all HRTD staff members, for example, some PDC staff members, particularly in the new reactor technology area, are also technical experts.

Systems Approach to Training (SAT) process in their previous employment.<sup>75</sup> A few HRTD staff members have degrees in education-related fields such as educational psychology and instructional design. Staff members at TTC and PDC stated that few of them have skills or experience related to the design, development, and delivery of e-learning programs. The majority of the online courses currently available through the LMS were developed by contractors or by HRTD staff using automated authoring tools. These courses have varying levels of interactivity—ranging from “page turners” to limited interactivity in the form of online tests.

3.6.3 HRTD needs to identify the skills necessary to implement their chosen e-learning strategy, assess the skills of the current staff, and develop a plan to close the skill gap.

NRC has an established strategic workforce planning process in place to identify critical skills gaps in the employee population. The same process may be useful in helping HRTD assess the skills needed to implement e-learning, assess the current availability of those skills, and develop a plan for closing the skill gaps. Gap closure tactics may include one or more of the following:

- Train current staff to attain the necessary skills - develop a training plan to close the skill gaps and identify appropriate sources for training the staff.
- Hire the necessary skills - revise or develop appropriate job descriptions.
- Outsource the development of e-learning solutions - revise current statement of work templates to ensure the contracted team includes personnel with the requisite skills.

While many organizations decide to outsource their e-learning development or purchase off-the-shelf learning products in the early stages, most transition to building their own

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<sup>75</sup> By their own assessment, staff members have had varying levels of training and experience in use of the SAT process.

learning products as their learning strategies evolve and demands can no longer be met with packaged solutions.<sup>76</sup>

3.6.4 Attempting to develop effective e-learning programs without the necessary skills can lead to frustration for the staff and ineffective learning opportunities for employees.

Viewing the implementation of e-learning as merely an extension of existing classroom learning can lead to frustration, wasted time and ineffective learning products. Building on current strengths and finding ways to supplement weaknesses is the suggested way to build a highly functional team that can develop the appropriate learning solutions to respond to business needs.

#### **RECOMMENDATIONS:**

We recommend that the Executive Director for Operations:

17. Develop a process similar to the Strategic Workforce Planning Process to:
  - a. Determine the e-learning skill sets necessary to meet NRC's business needs;
  - b. Assess the current staff to determine the availability of the needed skills; and
  - c. Develop a plan to close any identified gaps—either through training, hiring or outsourcing.

## **4. Consolidated List of Recommendations**

We recommend that the Executive Director for Operations:

1. Review the current course files to identify gaps in necessary documentation.
2. Develop a plan and timeline for completing any missing course documentation.
3. Complete HRTD Operating Procedure 404 – Training Material Control to include a standard process for version control, tracking changes and assigning accountability for changes.

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<sup>76</sup>O'Leonard, 42.

4. Develop a plan to centralize course materials in one location, preferably a central repository on a shared server.
5. Develop a lifecycle maintenance procedure for periodically reviewing courses to ensure the learning objectives are still valid, the delivery mechanism is still the most effective, or the course is still meeting stakeholder needs.
6. Form a working group of select representatives from the program offices, regional offices, and HRTD to conduct a thorough review of the training calendar including location and frequency of courses, travel costs, and opportunities for efficiencies in course sequencing (i.e., course bundling). The group should identify problems and develop mutually agreed-upon solutions within the constraints of contractual agreements, budgets and resources.
7. Within contractual limitations, identify and schedule courses at the same time each year so employees can anticipate the availability of courses. Communicate these courses and dates widely to make sure employees, supervisors, training coordinators, and managers are aware of the annual schedule.
8. Before implementing the enforcement of course pre-requisites in the Learning Management System:
  - a. Determine the impact on employees' ability to take all required training within the allotted timeframe.
  - b. Communicate the change to NRC personnel in advance and allow opportunities for feedback.
9. Develop and implement new performance metrics to demonstrate mission alignment, effectiveness, and efficiency.
10. Develop and implement a plan to leverage the capabilities of the LMS for collection and reporting of chosen metrics. Specifically, evaluate the competency model capabilities to determine if they meet NRC's needs, including identifying competencies; linking courses (or course modules and learning objectives) to identified competencies and closing critical skill gaps.
11. Develop and implement a comprehensive cost tracking capability (including cost data for each course) to determine the most economical and efficient method to meet NRC's training needs.

12. Finalize Operating Procedure 410 including a new standardized student feedback form.
13. Develop an evaluation strategy plan that defines the data HRTD needs to collect at varying levels to demonstrate the impact of its programs on the agency.
14. Evaluate the capability for collecting evaluation data via the Learning Management System.
  - a. If the Learning Management System's capabilities meet the agency's needs, develop a business case for purchase and deployment of additional capabilities.
  - b. If the Learning Management System's capabilities do not meet the agency's needs, develop a plan for using alternative technologies to collect and analyze evaluation data.
15. Develop an e-learning strategy that establishes a broad, fundamental connection between e-learning and organizational mission, strategy, business objectives and performance improvement.
16. Develop an implementation plan for e-learning that includes, at a minimum:
  - a. An assessment of NRC's baseline technology.
  - b. A plan for roll-out, implementation, maintenance and ongoing evaluation of additional Learning Management Systems capabilities. The implementation plan should include a cost/benefit analysis of the available LMS features and how they can support NRC's business needs.
17. Develop a process similar to the Strategic Workforce Planning Process to:
  - a. Determine the e-learning skill sets necessary to meet NRC's business needs;
  - b. Assess the current staff to determine the availability of the needed skills; and
  - c. Develop a plan to close any identified gaps—either through training, hiring or outsourcing.



## **5. Appendices**

### **A.1 Scope and Methodology**

The scope was defined by the Office of the Inspector General in the Statement of Work and included nine factors for evaluation:

1. Determine if the agency has a formal process to ensure that changes in Federal regulations are promptly incorporated in training and development efforts.
2. Review how the agency identifies the appropriate level of investment to provide for training and development efforts and prioritize funding so that the most important training needs are addressed first.
3. Determine how the agency tracks:
  - a. the cost and delivery of its training and development programs, and
  - b. the number of students trained.
4. Review the process the agency uses to determine whether to design training and development programs in-house or obtain these services from contractors or other external sources.
5. Determine the effectiveness of agency coordination with designated technical experts during reviews of in-house courses to assess and revise both course content and training materials.
6. Determine what performance data the agency uses to evaluate the overall effectiveness of training and development activities to determine whether intended short and long-range program results are being obtained and whether adjustments are necessary.
7. Evaluate the agency process to ensure that offered training correctly matches staff needs and is available when needed.
8. Determine how the agency incorporates evaluation feedback into the planning, design, and implementation of its training and development efforts. Determine whether this feedback includes:
  - a. the participant's perception of course value,

- b. the view of the participant's supervisor as to whether individual performance improved, and
  - c. management's opinion of whether the overall training and development program is meeting short and long-range strategic program needs.
9. Determine whether the agency compares its training methods, or outcomes with those of other Federal agencies to identify innovative approaches or lessons learned.

The Booz Allen Hamilton evaluation team did not note any significant findings for factors 5 and 9 above. Factors 2 and 4 are addressed indirectly in Section 3.3 since improved performance metrics including cost data will help HRTD make more informed decisions about prioritizing training investments and using internal or external resources to develop and deliver training. The other factors are addressed in Section 3.

While specific training, development, and knowledge management responsibilities are shared among the regional offices, program offices and HRTD, this report focuses on training programs provided by HRTD.

The methodology for this evaluation was designed to obtain sufficient, appropriate evidence to address the nine evaluation factors, reduce risk to an acceptable level, and provide reasonable assurance that the evidence was sufficient and appropriate to support the findings and conclusions.

In defining the methodology, the evaluation team employed a three-phased approach (See Figure A.1.1) to ensure the program met the agency's goals of enhancing individual performance, identifying and meeting training needs, optimizing training resources, and encouraging continuous improvement and organizational performance. Each phase included critical steps and activities to ensure that a complete and thorough evaluation of the training program was completed.

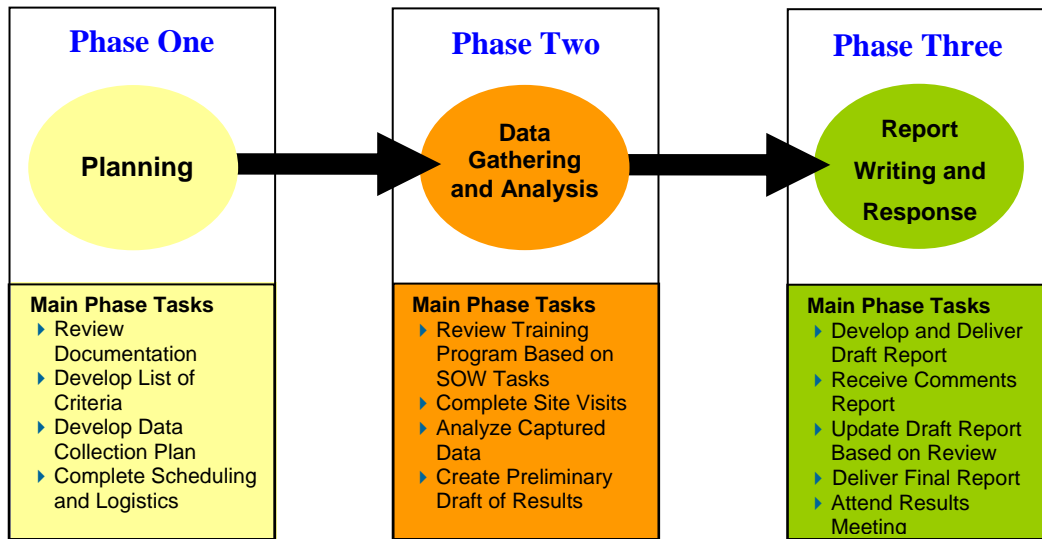


Figure A.1.1: Training Program Evaluation Methodology

**Phase 1 - Planning Phase:** The evaluation team reviewed the recommended NRC documents along with other materials to obtain a solid understanding of NRC and Federal Government training and development evaluation protocols. Based on the initial review, the team developed criteria for measuring each factor listed in the Statement of Work (SOW), along with an evaluation protocol, a data collection plan and a Standard Operating Procedure (SOP) for the conduct of site visits. During this phase of the project, the evaluation team regularly communicated with NRC OIG personnel to ensure our evaluation methodology met the needs of the agency and to complete scheduling and logistics for the site visits.

**Phase 2 - Data Gathering and Analysis:** During this data gathering phase, the evaluation team worked in cooperation with the Contracting Officer's Technical Representative (COTR) and NRC representatives to conduct site visits. During the course of these visits, the evaluation team interviewed knowledgeable staff members at Region I, Region II, the TTC, and the PDC. The interviewees represented a broad range of perspectives including employees who have taken training at NRC, supervisors/managers of employees who have taken training, regional executives, HRTD staff members, and HR management. Each site visit began with an entrance conference to introduce our team and its purpose. An exit

conference at the end of each visit allowed us to present and discuss initial observations, as well as allow evaluators to confirm information, ask questions, and provide additional data. Following each site visit, the team analyzed and synthesized the data to develop findings and trends. The data was presented for NRC review after each site in order to address issues and questions early.

**Phase 3 – Report Writing and Response:** The final phase was the development, review, and delivery of the findings and recommendation report which addressed all requirements included in Section 4 of the SOW. A preliminary report was developed for NRC review and a final report incorporated appropriate NRC comments. Evaluation team members attended the results meeting with NRC to review the findings and recommendations.

Booz Allen Hamilton has developed a tool called the Learning Organization Diagnostic to help learning and development leadership build a learning strategy by identifying strengths, weaknesses, and areas of emphasis (to improve Current State or envision Future State) across four Levers that are essential to successful training operations:

1. Technology Pervasiveness - focuses on the extent to which learning and performance technologies are considered and deployed.
2. Programs and Content Lifecycle - analyzes all of the curricula and programs across the organization. (Represents the core of training and development, and what most people will recall satisfactorily or unsatisfactorily about training operations.)
3. Operations and Processes - defines the administrative and managerial challenges in running training like a business.
4. Business Alignment - identifies the methods used to actively engage leadership in executing strategy and realizing success. (Area where most training and development departments fail to realize significant impact.)

These four Levers are further broken down into elements and sub-elements that drive to the level necessary to inform and action real change.

Similar to a Balanced Scorecard construct, the levers of the Learning Organization Diagnostic represent a holistic view of training operations and address opportunities for improvement. The Balanced Scorecard, developed by Robert Kaplan and David Norton, is used by many organizations to identify and manage achievement of long-term strategic goals beyond solely financial indices.<sup>77</sup> In fact, the Learning Organization Framework is aligned towards the specific drivers of the business of training and directly supports the Learning and Growth quadrant of a typical Balanced Scorecard. Through consistently monitoring achievement in each Lever, an organization can strike an eventual balance of capabilities.

The nine factors identified in the NRC Statement of Work were similar to many of the elements and sub-elements included in the Learning Organizational Diagnostic. Figure A.1.2 below illustrates how the nine evaluation factors align to the four levers in the Learning Organization Diagnostic.

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<sup>77</sup> The Balanced Scorecard identifies goals in the areas of Financial, Customer, Internal Processes, and Learning and Growth or Innovation.

<p><b>Technical Pervasiveness</b></p> <p>▶ None</p>	<p><b>Operations and Processes</b></p> <p>4.3 – Review how the agency identifies the appropriate level of investment to provide for training and development efforts and prioritize funding so that the most important training needs are addressed first.</p> <p>4.4 – Determine how the agency tracks the cost and delivery of its training and development programs, and the number of students trained.</p> <p>4.5 – Review the process the agency uses to determine whether to design training and development programs in house or obtain these services from contractors or others.</p> <p>4.10 – Determine whether the agency compares its training methods, or outcomes with those of other Federal agencies to identify innovative approaches or lessons learned.</p>
<p><b>Content Life Cycle</b></p> <p>4.2 – Determine if the agency has a formal process to ensure that changes in Federal regulations are promptly incorporated in training and development efforts.</p> <p>4.6 – Determine the effectiveness of agency coordination with designated technical experts during reviews of in-house courses to assess and revise both course content and training materials.</p>	<p><b>Business/Organization Alignment</b></p> <p>4.7 – Determine what performance data the agency uses to evaluate the overall effectiveness of training and development activities to determine whether intended short and longrange program results are being obtained and whether adjustments are necessary.</p> <p>4.8. – Evaluate the agency process to ensure that offered training correctly matches staff needs and is available when needed.</p> <p>4.9 – Determine how the agency incorporates evaluation feedback into the planning, design, and implementation of its training and development efforts.</p>

Figure A.1.2 – Learning Organization Diagnostic with OIG Evaluation Factors

As a result of the similarities, the evaluation team referenced the tool during the project to provide a broader context for the nine identified evaluation factors. However, the scope of this evaluation did not go beyond the identified factors. Figure A.1.3 below shows how the final recommendations address all four Levers in the diagnostic tool and provide a balanced approach to improvement.

<p><b>Technical Pervasiveness</b></p> <ul style="list-style-type: none"> <li>• Determine impact of enforcing pre-requisites in the LMS</li> <li>• Leverage LMS capabilities to collect performance metrics</li> <li>• Leverage LMS capabilities to collect evaluation data</li> <li>• Develop an e-learning strategy and implementation plan</li> </ul>	<p><b>Operations and Processes</b></p> <ul style="list-style-type: none"> <li>• Complete HRTD Operating Procedure 404</li> <li>• Complete HRTD Operating Procedure 410</li> <li>• Assess skills needed to implement e-learning</li> </ul>
<p><b>Content Life Cycle</b></p> <ul style="list-style-type: none"> <li>• Review current course files</li> <li>• Develop plan for completing missing course documentation</li> <li>• Centralize course materials</li> <li>• Develop lifecycle maintenance procedure</li> <li>• Review training calendar</li> <li>• Schedule courses consistently</li> </ul>	<p><b>Business/Organization Alignment</b></p> <ul style="list-style-type: none"> <li>• Develop new performance metrics</li> <li>• Develop evaluation strategy</li> </ul>

Figure A.1.3 – Learning Organization Diagnostic with Final Recommendations

## A.2 Materials Reviewed

In order to ascertain the current training and development environment at NRC, the evaluation team conducted a thorough background review of documents pertinent to this evaluation.

The list of documents reviewed per the SOW included:

- FY 2004-2009 NRC Strategic Plan
- FY 2008-2013 NRC Strategic Plan
- NRC's Training and Development Strategic Plan
- NRC Strategic Human Capital and Workforce Restructuring Plan
- NRC's Comprehensive Diversity Management Plan
- President's Management Agenda Leadership and Knowledge Management Standards for Success
- NRC's Strategic Workforce Planning process
- NRC's Planning, Budgeting, and Performance Management process
- Agency Performance and Accountability Report for FY 2006
- Office of the Inspector General report titled *Inspector General's Assessment of the Most Serious Management and Performance Challenges Facing NRC*, OIG-07-A-01, dated October 6, 2006
- Office of the Inspector General report titled *Audit of NRC's Technical Training Center*, OIG-07-A-05, dated January 9, 2007
- GAO report titled *Retirements and Anticipated New Reactor Applications Will Challenge NRC's Workforce*, GAO-07-105, dated January 17, 2007



- GAO report titled *NRC Based Its Decision to Move Its Technical Training Center on Perceived Benefits – Not Costs*, GAO-01-54, dated October 19, 2000

In addition to the documents outlined in the SOW, the team conducted a thorough review of a number of internal NRC materials related to training and development. These materials were provided by HRTD staff or by regional personnel and helped support the trends identified during the background research and in-person interviews.

The list of additional documents reviewed included:

From Region I

- ROI 0410.4 Revision 3, Region I Training Council
- Training Council Agenda and Minutes, April 1, 2008
- Region I FY 2008 External Training Plan
- Region I Internal Training Schedule

From Region II

- ROI 0402, Rev. 5, Region II Training Program
- ROI 0403, Rev. 1, Regional Required Training Program
- ROI 0451, Rev. 10, Site Access Training for Regional Power Reactors and Fuel Facility Inspectors
- ROI 0452, Rev. 5, Respiratory Protection Qualification
- ROI 0603, Rev. 2, Designated Individuals to Certify Individual Study Activities and On-The-Job Training for Inspector Qualification
- Region II Training Plan

- Prioritizing Training Requests (a description of each priority)
- Region II Employees in Developmental Programs
- Qualification Program Sequence Chart
- Inspector/Examiner Qualification Status
- Inspector Refresher Training Status
- Supervisory Training Status
- Division Training Matrices
- Training Region II Has Sponsored
- Announcing I-Learn

From other sources

- Training materials used for Licensing Course and Inspection Course
- HRTD Operating Plan
- NRC Management Directives (6.8, 7.3, 7.5, 9.25, 9.29, 10.131, 10.137, 10.67, 10.77)
- Inspection Manual Chapter 1245 and 1246
- Office of the Inspector General report titled *Review of NRC's Administration of Selected Contracts and Acquisition Workforce Training*, OIG-04-A-10, February 19, 2004
- Information Digest 2007-2008
- HRTD Policies (including current and draft)

- Copy of sample statements of work
- Copy of sample acquisition strategy milestones
- 2007 metrics tracked by TTC
- Questionnaire for New Training Course Development
- Report of the HRTD Working Group to Address the NRC Inspector General's Recommendation Regarding Student Evaluation of Instructor Performance (Oct. 5, 2007)
- Copies of student evaluations for a Site Access Training Course
- e-Learning Plan
- NRC Form 368
- Individual Development Plan Process
- Secretarial Qualification Program
- Memo and form for Evaluation of Nuclear Safety Professional Development Program (NSPDP)
- Sample evaluation forms for Acquisition Training and Reactor Technology Training
- List of organizations/groups to which HRTD staff belong

### A.3 Suggested Components of an e-Learning Implementation Plan

Companies and agencies that have successfully implemented e-learning have found these components to be important.

#### Technology considerations

- An assessment of the baseline technology requirements and capacity.
- A plan for roll-out of new capabilities and technologies.
- A maintenance plan for chosen technologies.

#### People considerations

- A change management plan. Successful organizations recognize that e-learning is a type of change and must be accompanied by a comprehensive change management plan including strategies for training users and developers.<sup>78</sup>
- A marketing and strategic communications plan. Studies show that the availability of e-learning does not automatically guarantee its use. On-going communications are also needed to sustain learner motivation and engagement.<sup>79</sup>
- Strategies for gaining executive level support. When the e-learning effort is aligned with the goals of the organization and has the visible support of senior management, most other barriers to implementation and acceptance will be minimized or eliminated.<sup>80</sup>

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<sup>78</sup> Brandon, 46.

<sup>79</sup> Paul Weaver, "Preventing e-Learning Failure: Ten Pitfalls and How to Avoid Them," T+D Magazine, May 2002, 45-48.

<sup>80</sup> Soomyung Cho and Zane Berge, "Overcoming Barriers to Distance Training and Education," USDLA Journal August 2002, 16.

## Policy considerations

- A governance plan. Bersin suggests a three-level best practices governance model: 1) Steering Committee that ensures alignment of training with the mission and strategy of the organization; 2) Learning Council who prioritizes program allocations; and 3) Training Operations who are responsible for the operation and execution of programs, resource allocation, and measurement of satisfaction and results.<sup>81</sup>
- A plan for identification and development of standards, templates, guidelines, etc., that need to be in place to support e-learning.<sup>82</sup>
- Establishment of procedures, processes, and workflows for the development, delivery, and maintenance of e-learning.<sup>83</sup> e-Learning needs to be incorporated into operational procedures for the analysis, design, development, delivery, and evaluation of training programs. An alternative is to develop separate operational procedures to address the different needs of e-learning.

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<sup>81</sup> Bersin & Associates, 47.

<sup>82</sup> Karen O'Leonard and Josh Bersin, "Rapid e-Learning: What Works © 2005," Bersin & Associates, August 2005, 7.

<sup>83</sup> O'Leonard and Bersin, 7.

#### A.4 Training Evaluation Levels

Level	Description
Level 1	Level 1 measures how students in a training program react to it. It answers questions regarding the students' perceptions - Did they like it? Was the material relevant to their work?
Level 2	Level 2 measures the extent students have mastered the skills, knowledge, or attitude goals of the learning product. Evaluating at this level answers the question: Did they learn what was intended?
Level 3	Level 3 measures the transfer of new skills to the workplace by the learners. Evaluating at this level answers the question: How well did the training impact on-the-job performance?
Level 4	Level 4 attempts to assess training in terms of business results. Evaluation at this level answers the question: How well did the training impact business performance?
Level 5	Level 5 measures the return on investment (ROI). It answers the question: What was the financial return on investment from the program?

Adapted from: Donald Kirkpatrick, Evaluating Training Programs (San Francisco: Berrett-Koehler Publishers, Inc, 1994), and Jack Phillips, Return on Investment in Training and Performance Improvement Programs. (Houston: Gulf Publishing Company, Houston, 1997).