



# Global Information Assurance Certification Paper

Copyright SANS Institute  
Author Retains Full Rights

This paper is taken from the GIAC directory of certified professionals. Reposting is not permitted without express written permission.

## Interested in learning more?

Check out the list of upcoming events offering  
"Security Essentials: Network, Endpoint, and Cloud (Security 401)"  
at <http://www.giac.org/registration/gsec>

# **“SELF”–Awareness and Security Training: Learning Management Systems for E-Learning**

**GSEC Assignment 1.4b**

**Prepared By: Malikah Smith  
May 2003**

© SANS Institute 2003, Author retains full rights.

## **Assignment:** Research Topic in Information Security

**INTRODUCTION:** Web Based and Interactive Training courses are emerging educational tools that are being implemented across a wide variety of corporate enterprises. Today, corporations are looking to replace traditional training programs with web-based, interactive training programs. Commercial vendors are responding to this demand by offering a variety of web based training and testing program for all levels of personnel and in many areas of security. Technology has caught up with this demand with emerging Learning Management and Content Management Systems.

Traditional methods of security training have learners conditioned to automatically respond to or even delete emails with the tell-tale subject line of "Security Tip of the Day"; sign off on unread briefings, and glaze over break-room posters with the funny little stick figure drawings. Developing and maintaining informative and current security briefings is resource intensive, and the materials are not easy to update or changed to integrate across an enterprise. The distribution of training materials and tracking training status can be difficult when employees are located in different geographical locations. The benefits of Web-Based, Interactive E-Learning or Distance Learning, Security Awareness courses are reduction of cost and training time, consistency of training materials, training materials can be easily updated, no restrictions on training locations and increased employee tracking functionality.<sup>1</sup>

### **WHY E-LEARNING?**

The overall numbers for the benefits of E-learning have been shown to range from 20 – 70% improvements in the areas of comprehension, material retention and training consistency. In a white paper authored by Susan Stamm she cited a 50 – 60% improvement in learning consistency and a 25 – 50% improvement in the retention of course material in an E-Learning environment versus traditional classroom teaching methods.<sup>2</sup>

Traditional training materials such as computer training laboratory centers, training manuals and/or briefings and training instructors, is costly and can be as much as one third of a company's expense. If required training courses are offered at an off-site location, or corporate personnel are located off-site from where training is being held, then travel expenses can dramatically increase the bill of the overhead in a company's overhead. Web-based training courses can be between 25 to 40% less than comparable classroom offered courses. Overhead is greatly reduced because no Lab resources are required. The need for the costly reproduction of manuals, briefs and other training materials, and possible travel expenses is eliminated.<sup>3</sup>

E-Learning is effective because web-based and interactive training course places the responsibility of learning on the student. Students who are motivated perform well with courseware that is stimulating and effeicent.<sup>3</sup>

An interesting statistic from BestWeb Training.com states that, “By 2003, only half of all IT training will be delivered via traditional instructor-led settings.”<sup>4</sup>

## **INTRODUCTION TO LEARNING MANAGEMENT SYSTEMS AND LEARNING CONTENT MANAGEMENT SYSTEMS – THE TECHNOLOGY BEHIND THE TRAINING**

We cannot discuss Web-Based or E-Learning interactive training without an introduction to Learning Management Systems and Learning Content Management Systems, the technology behind the point-and-click training.

### **Learning Management Systems:**

A Learning Management System (LMS) provides the administrative functionality behind a training system. LMS software provides the automated functionality to create and deliver training content, monitor student participation, and assess student performance. It also handles all issues related to providing access to training content, delivery of training content, user performance, tracking, and reporting.<sup>5</sup>

Typical LMS components are specific administrative tools such as student grade reporting, web page access tracking, student self-evaluations, progress status reports, web-based discussion groups, course web site statistics and account administration.<sup>6</sup>

A desirable LMS should easily facilitate and automated features such as:

System integration across enterprise departments. This function allows a department such as Human Resources to flag a new employee for initial training.

Mixed-Media Training Capability. An LMS is most effective when training can be provided in variety of formats to enable specialized and personalized training to reach a verity of students.

Courseware and Student Administration. Administrators will need the ability to manage user information and profiles, update training course content, run progress reports and track training schedules.

Assessment Capabilities. An LMS that can provide assessments of courses can help organizations build a robust training program over time.

Skills Management Capabilities. This capability allows the measurement of corporate training needs identifies improvement areas and performs skills assessments with the use of peer review or feed back forms.

Content Management Capability. LMS should have a component that will manage course content and enable the creation of a variety course material.

This last capability leads into the next E-Learning technology, Learning Management Content System.

### **Learning Content Management Systems:**

Where the LMSs manage student functions, Learning Content Management Systems facilitates the management of the training content. Almost all LCMS have LMS functionality built into them. LCMS enables the creation, storage, management and deployment of learning content in the form of learning objects.<sup>7</sup> The basic components that make up LCMS are Learning Objects, Learning Objectives, Learning Content, Metadata and Learning Object Repositories.

Learning Objects are simply digital blocks of learning information content that can be shared or reused, reusable learning objects, to achieve a variety of courses or presentations.<sup>8</sup> Reusable learning objects (RLO) allows the flexibility for material designed for use in multiple contexts to be reused more easily than material that would have to be rewritten for each individual context.<sup>9</sup>

Learning Content within learning objects can be textual or graphical and will be geared towards the learners with interactive elements. Learning content can be aware of learners and have the ability to store information about the learner's experience.<sup>10</sup>

Metadata, found in learning objects, is the term used for the information the learning objects contain about the learning content. Metadata is usually subject specific and can be cataloged and searched and reused. This type of subjected based metadata usually consists of information about the learning content, content language, and any prerequisite knowledge required.<sup>11</sup>

All of this learning object content is stored and managed in a central database called a learning object repository.

### **LMSs... LCMSs... Aren't They the Same Thing?**

No. But LMSs and LCMSs are complementary to each other. Here's how they shake out in a side-by-side comparison.

<sup>12</sup> Area	LMS	LCMS
Target Users	Training Mangers, Instructors and Administrators	Content Developers instructional designers, project managers
Provides Primary Management of:	Learners	Learning Content
Performance Reporting of Training Results	Primary Function	Secondary Function
Maintain Learner Profiles	Yes	No

<sup>12</sup> Source: Brand Hall. "Learning Management Systems and Learning Content Management Systems Demystified." Brandon-Hall.com. ([http://www.brandonhall.com/public/resources/lms\\_lcms/](http://www.brandonhall.com/public/resources/lms_lcms/))

Share Learner Data with an Enterprise Resource Planning System	Yes	No
Event Scheduling	Yes	No
Content Creation	No	Yes
Organize Reusable Content	No	Yes
Dynamic Pre-Testing and Adaptive Learning	No	Yes
Deliver Content by Navigational Controls and Learner Interface	No	Yes

## **E-LEARNING STANDARDS - SHARABLE COURSEWARE OBJECT REFERENCE MODEL (SCORM)**

An initiative, the Advanced Learning Initiative, by the Department of Defense to provide access whenever and wherever access to high-quality, tailor-able training materials was the catalyst for the development of the Sharable Courseware Object Reference Model (SCORM).<sup>13</sup>

SCORM is a set of technical specifications that facilitate interoperability, accessibility and reusability of Web-based learning content. SCORM documentation consists of a Content Aggregation Model (CAM) and a Run Time Environment - Application Program Interface (API). The CAM describes how to put learning content together so that it is reusable and the Run Time Environment – API documents how learning material will be presented, and how learner's progress will be tracked and reported.<sup>14</sup>

The implementation of SCORM will facilitate the sharing of learning objects, the incorporation of learning objections into other E-Learning courses, and changes to courses will at a minimum cost due to SCORM standardization.<sup>15</sup>

## **WHAT LMSs and LCMSs ARE AVAILABLE FOR SECURITY AWARENESS AND TRAINING?**

Vendors are quickly responding to the emergence of E-Learning, Distance Learning or Computer-based Training as the preferred method of training by today's corporations. There are a number of comprehensive, Security-Focused Training Products available for purchase and even a few training materials that are free.

## **GENERAL SECURITY AWARENESS E-LEARNING**

**The Company.** Native Intelligence, Inc. has developed comprehensive security awareness web-based training courses that target general users. K. Rudolph, CISSP, founded Native Intelligence and lends to the company's creditability by touting an active role in the development of the "Information Technology Security Training Requirements: A Role- and Performance Based Mode", authored by the National Institute of Standards

and Technology (NIST). Native Intelligence also provides SCORM compliant training courses.<sup>16</sup>

## **Web-Based Course Features**

Customizable Training Modules – Lets Corporation specific policies be included within the training modules.

Quiz Capabilities – Learners answer quiz questions on each module.

Feedback Evaluation Forms (web or email) – Allow students and Managers to provide input/suggestions to vendor.

Certificate of Completion Capability – Learners obtain Certificate to validate course completion.

Course Tracking and Completion Reports – Administrators are able to query the system database for user training status and to manage other administrators.

## **Training Course Content**

Many of the courses offered have 10 modules, narrated in easy to understand terms, and include real-world scenarios and practical application examples; fun-facts are also included in modules to enhance the learner's training experience.

Some General Security Awareness Training Courses include subject areas on Password Security, Incident Reporting, E-Mail Security, Privacy, Physical Security and Internet Security.

## **An Example of Module Learning Topics**

Password Security Module - This module covers Secure Password Characteristics, length and composition requirements. Password Cracking Methods and creating strong password techniques are covered. Social Engineering is defined and discussed and infamous password hacks are covered as real-world interest items.

Internet Security Module – This module presents discussions on networked systems and firewalls. The module covers one of the most popular types of attacks, Denial of Service attacks. Training is given on the risks of remote access to networks, and mobile code and cookies are defined in this module.

## **INTERMEDIATE TO ADVANCED SECURITY TRAINING**

**The Company.** The Redsiren Company offers what it calls their preventative solution, "Information Security University (InfoSecU)<sup>TM</sup>". InfoSecU provides organizations with a

complete web-based security training curriculum. Redsiren is CERT Coordination Center and the International Information Integrity Institute (I-4).<sup>17</sup>

## **Web Based Course Features**

Lesson Modules – Courses are presented in a series of lessons to facilitate comprehension.

Customizable Training Programs – Corporations have the ability to choose courses that will best suit the learning level of their employees.

Quizzes and Tests – Assist in the reinforcement of learning the course content. The quizzes are also used to track student progress and validate student comprehension of the material.

Illustrations and Animation – Used to enhance course material understanding and make learning interesting.

## **Training Course Content**

InfoSecU General Awareness program offers course in general and specialized security areas such as, Information Security Fundamentals, Information Privacy, Computer Crime and Identity Theft. More advanced training courses cover Public Key Management (PKI), Cryptography Concepts, Risk Management, Virtual Private Networks and Wireless Network Security.

## **An Example of Course Learning Topics**

Identity Theft Course – This course consists of six training modules, each lesson discussing an element of Identity theft such as, How identities are stolen, How to protect identity information, Regaining a stolen identity and the legal consequences of identity theft.

Introduction to Cryptography Course – This course examines cryptographic algorithms and keys. The three training modules cover the definition of private and public key technologies and discuss how they work. The course described the cryptographic process and introduces basic application of cryptographic systems.

Wireless Network Security Course – Targets an advanced IT learner with four modules of Wireless Security learning areas. The modules will cover assessing wireless security needs, the setup of a security wireless network and the identification of a vulnerable wireless network.

## **PRODUCT OR VENDOR SPECIFIC SECURITY TRAINING**



**The Company.** Sun Microsystems has developed an enterprise-wide E-Learning solution for corporations called Sun[tm] Enterprise Learning Platform (ELP). The Sun ELP offers Performance Metrics and Return-on-Learning-Investment Service and E-Learning Content Vendor services to help achieve standards-based interoperability in training programs.<sup>18</sup>

### **Web Based Course Features**

eMentoring Functionality – Designed to enhance the learners experience with subject matter expert interaction via the web.

ePractice Exams – Allows learners to practice for Sun Certification exams and provides instant feedback to help learners assess their knowledge levels.

Customized Web-Training Programs – Offers training solutions for individualized corporate needs.

Languages Options – Courses are offered in a variety of languages to facilitate comprehension and global learning customer base.

SCORM 1.1/AICC Compliant Web-Based Training – Enables training content interoperability and the integration of content from a variety of sources.

### **Training Course Content**

Sun offers web bases course in the areas of Network Sever and Firewall Security, Apache Web Server Security and the Development of Secure Commerce Applications.<sup>19</sup>

### **An Example of Course Learning Topics**

Network Security and Firewall Fundamentals – This course is taught in 8 learning modules. The modules covers security topics such as, creating an effective security policy, using network access controls, network security at TCP/IP levels, defines firewalls and discusses firewall security strategies. Detection and Response principles are also covered.

Apache Web Sever Security – The course is taught in four modules and outlines the security risk to web severs. The course includes a comparison study of three major web sever products, and a real-world project where learners will design a web sever system. Training Modules will cover the basics of Apache ports and support networks and securing web sites.

### **MANAGEMENT and TECHNICAL MANAGEMENT FOCUSED SECURITY TRAINING**

**The Company.** The Eno Corporation claims having the world's larges E-Learning content Library consisting of 20,000 learning objects. Eno has developed a number of

E-Learning solutions that include Content management, E-testing solutions and learning management integration solutions.<sup>20</sup> Eno is aligned with content partners such as, Digital Think and Smart Force, and also has academic partnerships with, George Mason University and Strayer University.

## **Web Based Course Features**

Graphic Design – Unique graphics to illustrate learning points.

Phased Learning Approach – Course are taught in four phases: Presentation – An introduction of concepts and theories; Demonstration – The application of concepts for a particular subject matter; Guidance – Interactive simulations that guide learns thought specific tasks; and Independent Practice – Learns perform real-life scenario tasks to implement the concepts learned.

Testing Functionality – Testing questions that are mapped against the course learning objectives.

## **Training Course Content**

Eno offers courses in the management areas of Project Risk Management, general Management, Intrusion Detection and Response, Business Continuity Planning, and Security and Security Management and Operations. Internet Security curriculums to include vendor specific learning modules are also offered.

Management and Security Course – Course is taught in 4 modules covering network management, Network procedures, physical network security and logical network security. Learning objectives include understanding how to plan, schedule and manage network availability; Identifying network threats, and threats to data in transit.

Internet Security: Multi-tier Virus Protection Course – This course identifies viruses and hostile applets and discusses methods of minimizing the threat they cause to networked systems. Four modules with topics covering viruses, protection against viruses and Hostile Java and ActiveX applets completes the lesson content.

Novell Directory Service (NDS) Security Management Course – This course is taught in 3 modules and they cover how to manage NDS security. Module topics include an Overview of NDS security, NDS rights inheritance for the managing of rights in the NDS tree; and guidelines in the management and troubleshooting of NDS security.

## **FREE ONLINE TRAINING RESOURCES**

### **Free Web Seminars**

Global Knowledge has developed a partnership with industry leading experts to provide free Taped and Live Web Security Seminars.<sup>21</sup>

## Topics

Recorded – Internal Network Security: Infrastructure, presented by Foundstone Strategic Security Corporation. The discussion will cover Layer 2 Attacks and Attack tools; Segmenting Network Resources; Intrusion Detection System Deployment, Firewalls and other network security concerns.

Live – Combating Internet Worms - An Integrated Security Approach, presented by Cisco System. This seminar will provide an overview of the SQL Slammer Worm, and how it spread.

## CONCLUSION:

E-Learning, Interactive Training or Web-based training has been shown to provide great improvements in the areas of cost, consistency and efficiency. The emerging technologies of LMSs and LCMSs will continue to advance making E-Learning a way of life, by taking away distance boundaries to classroom based learning, and providing instant training accountability through tracking and reporting features. E-Learning technologies are becoming compliant with new government standards, enabling interoperability and ease of access. The IT Security field has responded with numerous varieties of Security Training E-Learning Solutions that target all audience learner levels. All signals point to Security *Self-* Awareness and Training is not only on the rise but here.

© SANS Institute 2003, Author retains full rights.

## References:

1. Enterprise Training Solutions.  
([http://www.enterprisettraining.com/elearning\\_benefits.html](http://www.enterprisettraining.com/elearning_benefits.html))
2. Susan Stamm. "E-Learning: Challenging the Statistics." The Team Approach.  
(<http://teamapproach.com/estats.asp>)
3. BestWeb Training. (<http://www.bestwebtraining.com/WebvsClass.htm>) {IE-link}
4. BestWeb Training. (<http://www.bestwebtraining.com/statistics.htm>)
5. Search CIO.com  
([http://searchcio.techtarget.com/sDefinition/0,,sid19\\_gci798202,00.html](http://searchcio.techtarget.com/sDefinition/0,,sid19_gci798202,00.html))
6. Web-based Learning Management Systems.  
([http://ist-socrates.berkeley.edu/~fmb/articles/web\\_based\\_lms.html#IV](http://ist-socrates.berkeley.edu/~fmb/articles/web_based_lms.html#IV))
7. Suddenly Smart  
(<http://www.suddenlysmart.com/web1/AboutUs/CEOLetter/whatislcms.htm>)
8. David A. Williams. "Getting a Handle on Learning Content Management Systems." DARWIN. January 2003. (<http://www.darwinmag.com/read/010103/lcms.html>) {IE-link}
9. Warren Longmire. "A Primer on Learning Objects." Learning Circuits. March 2000.  
(<http://www.learningcircuits.com/mar2000/primer.html>)
10. All About Learning Objects.  
(<http://www.eduworks.com/LOTT/tutorial/learningobjects.html>)
11. Dave Feasey. "Meaning, Meta Data and E-Learning". Eyepopping Design. March 7, 2002. ([http://www.eyepopping.com/pdfs/Meaning\\_eLearning.pdf](http://www.eyepopping.com/pdfs/Meaning_eLearning.pdf))
12. Brand Hall. "Learning Management Systems and Learning Content Management Systems Demystified." Brandon-Hall.com.  
([http://www.brandonhall.com/public/resources/lms\\_lcms/](http://www.brandonhall.com/public/resources/lms_lcms/))
13. SCORM Info and Tools. (<http://www.altrc.org/specification.asp>)
14. SCORM. (<http://www.rhassociates.com/scorm.htm>)
15. Gail Repsheremery. "The benefits of SCORM." Washington Technology. November 4, 2002. ([http://www.washingtontechnology.com/news/17\\_16/emergingtech/19380-1.html](http://www.washingtontechnology.com/news/17_16/emergingtech/19380-1.html))
16. Native Intelligence Inc. (<http://nativeintelligence.com/awareness/index.asp>)
17. Redsiren. (<https://www.redsiren.com/infosecu/InformationSecurityUniversity.pdf>)

18. Sun Microsystems Inc. (<http://www.sun.com/smi/Press/sunflash/2003-02/sunflash.20030225.2.html>)
19. Sun Microsystems Inc.  
([http://training.sun.com/US/catalog/web\\_based/wlcnis\\_live.html](http://training.sun.com/US/catalog/web_based/wlcnis_live.html))
20. Eno.com. (<http://www.eno.com/trainonline/index.html>)
21. Global Knowledge.  
([http://www.globalknowledge.com/training/category.asp?PageID=9&catid=248&met  
hodid=s](http://www.globalknowledge.com/training/category.asp?PageID=9&catid=248&met hodid=s))

© SANS Institute 2003, Author retains full rights