ELMSLN: A Disruptive Learning Technology

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What is it?

The E-Learning Management System Learning Network (ELMSLN) is an open-source Drupal 7 initiative. Feature-rich out of the box, it is designed to be extended and adapted to any user need. It is comprised of Drupal modules, profiles, and distributions that communicate through a central connection point, allowing course and student data to move securely between various tools, yet provide a unified and robust production workflow for Learning Designers, and most importantly, a cohesive learning experience for students.

Due to the open-source, modular nature of ELMSLN, any person or group can develop and contribute. By building on top of this platform, designers and developers can collaborate to build tools that replace functionality of third party vendors, expanding the default feature set of ELMSLN and creating a more sustainable infrastructure. While other open-source LMS initiatives do have developer communities, they pale in comparison to the size and scope of the projects available on Drupal.org.

A VM profile can be quickly duplicated on VMH servers and is open for any College at the University to request and use.

Who is using it?

ELMSLN is running courses in the Penn State College of Arts and Architecture (AandA) and at the University of Wisconsin Madison Center for Patient Partnerships (CPP). AandA has some grant funding with Penn State Eberly College of Science Statistics department to have a testing environment for experimentation as well, though this is an innovation feeder for others using the system.

Wisconsin's CPP is a member of the University of Wisconsin Law School and has a grant funding to establish an ELMSLN pilot for the Law School.

Collaboration

There is a growing consortium of ELMSLN collaborators, who hail from various colleges at Penn State and beyond. The added benefit for all to use this system is that collaborative developer groups will organically form for mutually beneficial projects, reducing the cost for all of the units involved to produce new tools. Not only are these collaborations already happening, but also they will continue to expand as the platform becomes more popular and new modes of engagement are identified for online learning.

Accessibility

ELMSLN has been evaluated by the Penn State Office of Disability Services and is cleared for use in serving online courses. Many accessibility enhancements have been engineered into platform since ELMS for Drupal 6 was developed, and these enhancements make a huge difference in the online course experience for users with various types of impairments. However, accessibility is still a major area for improvement for web sites and applications in general, and will be an ongoing design and development focus for ELMSLN moving as the project progresses. Accessibility is linked to sustainable design and development practices.

Scalability: Virtual Machine Hosting and Managing

One of the major advantages of moving to a Virtual Machine Hosting (VMH) environment is that the burden for local college IT groups will be lessened as they won't have to learn, manage, and maintain a new system. Instead, VMH staff, experienced with ELMSLN server implementations, will ensure proper management. Extended development for a centrally managed ELMSLN server is currently being paid for by an internal innovation grant.

The precedent for online learning infrastructure being externally hosted has already been set through use of Blackboard, ANGEL, and other CMSs, and the many units using VMH to serve online courses, websites, and other web-based applications. However, due to the proprietary nature of some of these services, we cannot actively develop for and contribute features to them.

Automation

ELMSLN uses Drupal and server automation scripts to provide a way for instructional designers to create standardized course implementations automatically in minutes. These course implementations can be customized, reused, and shared or become one-off custom course solutions. This is unparalleled flexibility.

Central Management of Content

Managing content for online learning is one of the most important and difficult tasks a learning designer can be faced with. There can be many content versions and editions for each course depending on the semester, section, and instructor. Updating this content across multiple courses while maintaining the changes made by each instructor for their section can become very confusing and time consuming. ELMSLN solves these issues by offering a user interface that keeps track of the various content iterations for each course. A learning designer has many options to fit their desired workflow, including the ability to use master course content, clone and fork master or existing content, and use short code embeds to provide updatable content across all courses.

Multimedia Asset Management

ELMSLN also has a media asset management system. This system is used to store and track every video, audio track, and image used in all courses. It also supports custom video streaming servers, and external sources like Vimeo and Youtube.

The media management system serves assets to all courses through embed short codes, which are generated for all multi-media automatically. The main advantage is that media embed code can be adjusted in the asset management system to meet emerging accessibility best practices, which would in turn update every single instance of that media in all courses simultaneously.

Functions and Processes of ELMSLN

Some of ELMSLN goals are to produce a sustainable and scalable online learning ecosystem as well as investigate and invent innovative solutions to digital learning. Facets of this ecosystem include managing professional relationships with course authors and instructional designers, providing rich learning experiences for a diverse student base, and cultivating and practicing a variety of intellectual and technical endeavors including but not limited to:

- Predicting shifts in course production technology
- Envisioning changes in learning culture
- Following best practices for accessibility and sustainability
- Engineering custom open-source tools, researching and deploying high design and user interaction standards for the web; and
- Creating, managing, and tracking multimedia assets.

Unfortunately, there is no one perfect solution to every problem, so flexible and adaptable approaches are needed. This document discusses how this new infrastructure will help ensure a sustainable and successful online learning ecosystem.

Benefits

- Reduced time spent managing courses opens time for experimentation and innovation.
- Transition to ELMSLN will provide an opportunity to revisit applications for good design to course experiences.
- Centralized CSS updates that can be applied to one or all courses
- Recognition for using ELMSLN and the ability to present on collaborative technologies and innovation in online learning
- Built-in high definition analytic data
- Mitigated risk through standard automation and reconfigured setup routines.
- Provides cohesive learning experience to students

VMH Overview

Efficiency

To cultivate this kind of scalable and sustainable environment, our learning design team requires the support of automated course production tools that will remove the tedium of redundant low level tasks. These tools, standardized to security and development best practices, enable courses to be created on-demand and in roughly 3-7 minutes with ELMSLN installed on VMH servers. The local IT groups ticketing system depends on the availability of an IT staff member and can be a multi-day process.

Specialized Roles

Though there are exceptions, server administrators are generally skilled with typical server administration tasks, but not acquainted with the nuances of a Drupal based course management architecture. Both Drupal and ELMSLN offer levels of abstraction that require the supervision of employees that hold intimate knowledge of the software and server configuration for performance optimization, security, and advanced Drupal caching beyond the capabilities of Drupal core. Employees familiar with Drupal ELMSLN nuances implementation, performance, and automation are currently employed at VMH.

Automated Best Practices

As ELMSLN continues to evolve based on the collaborative contributions from various universities and colleges, more best practices, tools, features, security enhancements, and workflows will be discovered, vetted, and incorporated into ELMSLN by the active project maintainers. Server automation and performance is actively developed and provided by VMH employees and is necessary to enhance the project. Generally speaking, local IT staff university-wide have a range of responsibilities making it very difficult for them to take on these kinds of projects, and therefore are not recommended to deploy and maintain ELMSLN servers.

Security

ELMSLN has been evaluated and vetted by the ITS Security Operations and Services (SOS) to ensure that student Personally Identifiable Information (PII) is protected and that no known security vulnerabilities are exposed. Additionally, SOS conducts monthly scans of the VMH server and the VMH team applies server patches monthly as well

Stability, Scalability, and Performance

Often times, a hardware configuration is selected based up the initial needs of a online learning unit. However, as online course offerings grow, and new features are added, server hardware can be quickly outdated. VMH offers monthly payment structures where processors and ram can be added as needed. Additionally, during times of low student enrollment, such as a summer session, server specs and monthly cost can be reduced to only what is needed. This kind of flexibility is typically not offered by college IT units.

VMH co-developed much of the ELMSLN cache and server automation technology with the project maintainer. ELMSLN has been heavily tested for stability under heavy user load.

Data Analytics

ELMSLN tracks per page view per person and can see people in real time and where they are connecting in the world. Using a project called PIWIK, ELMSLN can break things out based on individual user, the section they are in, or roles that they have (student vs instructors for example). It collects all available information about what kind of machine they are using which can help w/ troubleshooting and can filter out the data based on course and currently give analytic dashboards in each course

Roles

Project Manager

A project manager for an online learning unit can be any number of people depending on the kind of project. This role requires only a basic understanding of Drupal. Basic training is available at very low cost or free online. For a learning unit deploying ELMSLN, a director/manager will need high level familiarity with how ELMSLN works, its current built in features, awareness of ongoing collaborations in the ELMSLN community, and a general understanding of the possibilities for further tool and feature development.

Visual/Graphic Designer

A visual designer will need a basic understanding of Drupal, but a thorough understanding of how graphics adapt for display and interaction devices on the web. An ELMSLN designer might prioritize visuals to account for accessibility criteria including but not limited to proper color contrast, readability of large areas of text, graphics features to assist with learners who have cognitive disabilities, and additional user experience best practices.

This role could include a full-time graphic designer, a graphic design intern, or an external design professional. It is not advised that Back-end Developers with little design experience attempt this role.

Themer/Front-end Developer

A themer will have a very good understanding of Drupal, and how a particular site is constructed. A themer for ELMSLN typically will adjust CSS, HTML and jQuery to implement graphics created by the visual designer as they relate to course content, multimedia, and course management tools. This person also focuses on accessibility best practices for building interfaces that students with visual, hearing, motor, and cognitive impairments might use. Accessibility best practices are constantly evolving, and therefore themers need to understand sustainable design practices. Sustainability in design refers to the ability of a theme to adapt to change over time, so that the theme does not become obsolete and is capable of iterative improvements. In order for an theme to be successful, the Themer should have ongoing design discussions with the site builder(s). It is strongly advised, for the purposes of accommodating the litany of requirements for modern online courseware, that an actively developed 'base theme' from Drupal.org be used and sub-themed.

This role could include a graphics intern or professional with some coding and markup skill or a developer with some graphics and markup skill.

Site Builder

A site builder will have an in depth understanding of how Drupal works and how to assemble Views [drupal.org/project/views], adjust layouts, assign user roles, and ensure the user experience is what the visual designer or user experience designer intended. A site builder can typically build complex web application projects by utilizing the modular functionality Drupal provides, without writing code.

This role could include an intern or professional with minimal coding skill, but a good understanding of how to provide the appropriate markup for a themer to use when theming.

Back-end Developer

A back-end developer will have expert understanding of how Drupal works, will be highly skilled in PHP or other languages, have familiarity with database technology, and have medium to high server administration skill. This person is typically very active in the Drupal community and may have some project commits to Drupal.org.

A back-end developer is not required for running and maintaining courses running on ELMSLN, one of the key advantages of the platform. However, a back-end developer may be desired if the learning unit wants to contribute modules and features not already developed for ELMSLN. It is highly encouraged, but not required, for modules and features being developed to be included on Drupal.org for the open-source community to use.

Technical Architect

This role is typically not needed full-time for utilizing ELMSLN on a day-to-day basis. However, a full-time architect or liaison with a Drupal.org ELMSLN maintainer may be desired if a unit intends to install ELMSLN for the first time, contribute new functionality and future direction to the existing project, or fork the project to go in a direction not in keeping with the vision of ELMSLN maintainers. Contact information for the current ELMSLN maintainer is can be found here: [drupal.org/user/24286]

For more information

http://elmsln.org

http://www.law.wisc.edu/newsletter/Articles/Law_School_programs_receive_fund_2014-03-04

https://elms.psu.edu/blog/post/umw-law-school-awarded-grant-pilot-elmsln