Application for 2014 University of California Larry L. Sautter Award for Innovation in Information Technology

Project Title: Laboratory Hazard Assessment Tool (LHAT)
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Project Leaders
• Cheryl Lloyd, Chief Risk Officer, Risk Services, UCOP
• Erike Young, EH&S Director, Risk Services, UCOP
• Ken Smith – Executive Sponsor, Laboratory Safety Manager, UCOP
• Craig Merlic – Product Owner, Professor of Chemistry, UCLA
• Safa Hussain, Director IT Services, UC Davis

Development Team Members
The LHAT project’s success has been dependent on the support of the IT Services Organization as well as the research and Environmental Health & Safety (EH&S) communities. As part of the development process at IT Services, numerous staff and faculty provided guidance, feedback, expertise, and insight, contributing to the success of the project.

The team members listed below made up the core application development team:
• Ryan Mosley, Scrum Master & BA
• Moira Heilmann, Scrum Master
• Jessica Eisner, Test Engineer
• Tim Holmes, Developer
• Yashpal Singh, Developer

Functional Team Members

• Scott Rychnovsky, Ph.D.
  Professor and Chair of the
  Department of Chemistry and Biochemistry
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Summary
Due to recent accidents in University of California (UC) laboratories, there has been increased focus and review/implementation of regulations for UC research laboratories, particularly those labs which store and use dangerous chemicals. The UC Office of the President (UCOP) recognized the growing burden new safety regulations were causing faculty and invested technical resources to develop online systems to manage the various aspects of laboratory safety and management. The Laboratory Hazard Assessment Tool (LHAT) is one of these systems, developed by IT Services.

LHAT is a University of California systemwide assessment tool that helps Principal Investigators identify activities and hazards to ensure that Lab Personnel are properly protected in their work environment. LHAT provides an online solution that facilitates reviews of lab risks, as well as the on-going distribution of Personal Protective Equipment (PPE).

Project Description

How It Works

![LHAT Process Infographic](image)

Principal Investigator Laboratory Hazard Assessment
LHAT is built to allow a Principal Investigator (PI) to identify activities performed and hazards present in their laboratory by completing a laboratory hazard assessment. The PI then shares the identified activities and hazards with lab personnel who will also be involved with the identified hazards. Based on information provided by the Principal Investigator, the system generates personal, shared, and custom PPE recommendations for that laboratory.

Lab Personnel Hazard Assessment and PPE Training
Once hazards and PPE recommendations have been identified, Lab Personnel use LHAT to review the laboratory hazard assessment as well as complete the Outfit for Safety PPE training and certify they are aware of hazards and recommended PPE for their laboratory.

Laboratory Roster
A Laboratory Roster was built into LHAT so that Principal Investigators and EH&S personnel can track who is working in the laboratory, the status of PPE training, hazard assessment review, and the distribution of PPE to comply with the UC PPE Policy.
Environmental Health and Safety

LHAT also offers Environmental Health & Safety personnel the ability to view laboratory hazard assessment information as well track who is working in laboratories, status of PPE training, and PPE distribution.

PPE Checkout

Through the PPE Checkout feature, EH&S personnel are able to record distribution of lab coats and eyewear. This distribution is then tracked through the laboratory roster and through the LHAT Environmental Health and Safety Reporting feature.

LHAT URLs

LHAT’s test drive site, where users can try out each of the roles in a demo environment, is available at this URL: https://ehs.ucop.edu/lhat-demo/

Note that this is a demo site and any information entered should be considered temporary.

LHAT is live and currently accessible at this URL: https://ehs.ucop.edu/lhat/
Note that this is a live site. Information entered should be considered permanent, and certain actions may generate notifications to other system users.

Project Benefits

Innovative
In order to be in compliance, Lab personnel working with the hazards not only need to get the PPE, they also need to be trained on how to use and wear it. One of the requirements given to the team by the Product Owner was for the system to record this training in the LHAT system. The team utilized the UC Office of the President Outfit for Safety PPE training video, embedded it into the system, created a supplemental PDF and quiz, so that Principal Investigators and Lab Personnel are trained on the proper care and use for lab coats and eyewear all within LHAT.

Operational Efficiency and Accessibility
LHAT replaces a manual and paper-heavy process. Previously a PI would have to look up the Material Data Safety Sheets (MSDS) for all of the chemicals they are working with to determine what level of Personal Protective Equipment (PPE) was required. LHAT expedites this process greatly by allowing Principal Investigators to enter the hazards they work with into the online system and in return, the system calculates the minimum required PPE.

The system additionally produces a printable PPE voucher. The printable LHAT PPE voucher has been a key element in the UC-wide distribution of lab coats and eyewear. Principal Investigators and Lab Personnel who have completed PPE training and certification of a laboratory hazard assessment in LHAT are able to print a PPE Voucher which lists the lab coats and eyewear recommended for activities performed in their lab group. The PPE Voucher is taken to a campus PPE...
distribution event or center to obtain PPE for work in the lab. After completion of the PPE Events, the system will continue to provide PPE vouchers which users will be able to redeem at their campuses’ specified distribution location.

Figure 3 PPE Printable Voucher

Shareable/Interoperable
LHAT was developed with the intent that any PI or researcher at any University of California could use the system. The system uses UC Trust for authentication and pulls people and building data from the Core Services application developed by IT Services. Currently 8 of the 10 campuses are using the system and the code has been shared with UCSD (who wanted to manage their own instance).

LHAT not only integrates with the Core Services application (which is integrated with PPS and Facilities Database at all 10 campuses) but it will also be integrated with the whole EH&S Suite of systems, eventually providing PI-identified hazards to Lab Inspectors using the IT Services developed Safety Inspection Tool (SIT).
Collaboration
LHAT was a product with input from faculty, researchers and EH&S professionals. The effort was led by Dr. Craig Merlic, a researcher and associate professor from UCLA. Craig was able to utilize his experience with the existing UCLA tool and build upon the business process to develop a robust and successful system. IT Services follows an Agile methodology, and end users were involved throughout the development process of LHAT.

Technology Used
LHAT uses jQuery with HTML5 and CSS3 as the front-end technology. jQuery is a JavaScript library that immensely simplifies programming with JavaScript, and it makes programming JavaScript compatible with different browsers. LHAT uses Twitter Bootstrap 3 to support a responsive user interface on a tablet as well as a desktop computer.

Backend technology stack:
- Java 7
- JPA
- Spring MVC/Security
- Hibernate
- SQL Server
- Tomcat
- Quartz Batch with Spring

Project Timeline
LHAT was developed in iterative cycles, beginning in early April 2013 and released November 1, 2013 for the first campus PPE distribution event at UC Merced. Upon release, feedback was continuously collected and changes/enhancements were implemented for an additional three months.

Customer Satisfaction Data
Statistics/Success Criteria
After six months in production, LHAT has been adopted by eight University of California campuses and has over 23,000 users in the system.

To date, the system has been used to produce PPE vouchers for seven of the eight PPE distribution events and will be used for UCSF’s in June. The events were successful largely in part to the software and its capability to produce the PPE voucher for the event and track what PPE was assigned at the event.
Testimonials

“The talented staff at UC Davis have developed robust, user-friendly software tools intended to allow researchers to significantly increase both their safety and regulatory compliance.

The Laboratory Hazard Assessment Tool provides Research Faculty and staff to identify the hazards with which they work and efficiently communicate these hazards to everyone in the lab. From this information, the appropriate Personal Protective Equipment (PPE), lab coats, aprons and safety eyewear is identified. The researchers are trained on the use of their PPE along with when, and to whom, the lab coats and safety glasses are issued. All of this is provided and tracked by this tool.”

Russell Vernon, Ph.D., Director of Environmental Health & Safety University of California Riverside

“The Laboratory Hazard Assessment Tool (LHAT) provides an elegant solution to the challenge of developing personal protective equipment hazard assessments for every laboratory on campus. The clear and visually-appealing user interface allows virtually all faculty, staff, and students to use the system with no prior training or assistance. The standard LHAT assessment process and questions are easily understood, and the system also allows for custom entries. Because LHAT is web-based, the system administrators can access assessment data for any lab group from any location, assisting with real-time regulatory compliance.”

Lisa Wisser, Laboratory Safety Program Manager, University of California Santa Cruz