Establishing paradigms for modifying and developing the Workforce Development section of the Science Gateways Community Institute Site

Alma Salisbury, Hagen Hodgkins, Sincere Ponton Mentor: Jeff Wood
salisburyalma@gmail.com, hagen.hodgkins@gmail.com, pontonsinceregse@gmail.com, wood684@gmail.com
Elizabeth City State University

Abstract - The Center of Excellence in Remote Sensing Education and Research (CERSER) program on the campus of Elizabeth City State University is currently partnering with the Science Gateways Community Institute (SGCI) which is led by the San Diego Supercomputing Center (SDSC). SGCI is divided into five sections to support members of the gateway community: Incubator, Extended Developer Support, Scientific Software Collaborative, Community Engagement & Exchange, and Workforce Development. Dr. Linda Hayden, the CERSER Principal Investigator, leads the Workforce Development Section. The Workforce Development goals are to increase the development pipeline of science gateway young professionals and educators with an emphasis on increasing involvement of students from underrepresented groups.

As science today grows increasingly computer based, it poses challenges and opportunities for researchers. Scientists and engineers are turning to gateways to allow them to analyze, share, and understand large volumes of data more effectively. The existence of science and engineering gateways and the sophisticated cyberinfrastructure tools together can significantly improve the productivity of researchers. Most importantly, science gateways can give uniform access to the cyberinfrastructure that enables cutting-edge science.

The goal of the science gateways team was to increase the interactivity of the SGCI Workforce Development section of the SGCI web site to attract potential members and publicize needed information. SGCI had recently converted to the web platform Liferay from WordPress which necessitated the need to learn a new platform and its capabilities. The pages on the SGCI server were not able to be accessed during this project due to design and team coordination efforts. The proposed modifications for this project were completed utilizing HTML, CSS, and graphical modeling.

Keywords: SGCI, Science Gateways Community Institute, Liferay, Workforce Development, HTML, CSS, Linda Hayden, Lexicon

I. INTRODUCTION

A. SGCI Workforce Development Site Enhancements

The CERSER program, in partnership with SGCI has collaborated to develop a website for the purposes of providing support services and information to those working on or with gateway projects.

The goal of the Workforce Development is to increase the pipeline of young professionals and educators working with gateways. To this end SGCI has converted from the web development platform WordPress to Liferay. This resulted in the need to train those working on web development to become familiar with the new system and its capabilities. Texas Academic Computing Center (TACC) is leading the website development and maintenance. Currently minor changes to the Workforce Development portion of the site are made through submissions to the University of Michigan.

The focus of the Science Gateways team, overseen by Dr. Hayden, was to establish a method of creating and modifying information on the SGCI Workforce Development site. The Science Gateways team attempted to obtain modification capabilities to the Workforce Development section of the website, but was unable to during this research period. In place of this, alterations to the SGCI Workforce Development section were suggested and designed by the Science Gateways team and were created using HTML, CSS, and graphical modeling.

B. Science Gateways Community Institute

The Science Gateways Community Institute (SGCI) is an organization that provides resources and expertise that is used by scientist and engineers that are focusing on gateway development. SGCI is

funded through the National Science Foundation (NSF) and uses these funds through multiple domains. A gateway connects networks so devices on them can communicate. The different gateways connect scientist and engineers around the world. Because they are so attainable by researchers throughout the country, the gateways have become more productive for interactive use.

C. SGCI Workforce Development

SGCI uses Workforce Development to expand the knowledge for students and educators. They focus on the knowledge of minorities in science, technology, engineering and math (STEM) areas. SGCI is able to reach these groups of people using workshops and internships through financial support, the Young Professionals Network, and mentoring. With the help of these student focused programs, SGCI is able to sponsor coding workshops and organized lectures for students.

D. SGCI Young Professional Network

The SGCI Young Professionals Network is a group for individuals who are either just entering the Science Gateways arena or those researchers and educator who are experienced in gateway development. Advisors and resources are put in place to assist all groups in the development of gateways. SGCI draws from several organizations and institutions to provide assistance to young professionals and their technical advisors. [1]

E. SGCI Internships

SGCI is offers several opportunities for students, both graduate and undergraduate, as well as young professionals to take part in internship programs. Those chosen to participate in the programs as interns will be placed at one of seven possible universities that have partnered themselves with SGCI. [2]

II. SOFTWARE/LANGUAGES

A. Content Management Systems

"A content management refers to the system and processes whereby information is created, managed, published, and archived." [3] Content Management Systems (CMS) refers to the infrastructure for the process of curating content to take place. The utilization of a CMS allows for numerous contributors to provide content as well as collaborate throughout the lifecycle of the CMS.

B. Liferay

Liferay is an open source platform the purpose of which is to be utilized in the creation and management of extranet and internet content. The platform has been branded as a web application framework rather than as a content management system [4].

C. Lexicon

Lexicon is a design language created with the aim of providing a common framework for building interfaces within the Liferay product ecosystem. Lexicon was developed by Liferay and is based on Atomic Design, a modular paradigm. With Lexicon the user is able to define the dimensions of a webpage via a grid system.

D. Hypertext Markup Language

Hypertext markup language (HTML) is the standard language used in the creation of web pages. It is an uncompiled coding language that can be edited from a text editor, this makes it highly accessible. The way that the web is traversed is through the use of hypertext. This is text which calls content from other areas or sends the user instead to different web pages. HTML is primarily composed of a series of elements or tags that most browsers are designed to recognize.

E. Cascading Style Sheet

Cascading Style Sheets (CSS) is a stylesheet language that is used for visual styling of web pages using HTML. It is used to separate presentation such as layout, fonts, and color from content. Using CSS improves flexibility for the user to control presentation characteristics. In CSS, there are rules that affect how a web page is displayed. [5]

III. METHODOLOGY

A. Introduction

This research sought to establish a paradigm by which the Workforce Development sections of the SGCI website could be updated. This site was designed and is currently maintained by the Texas Advanced Computing Center (TACC) personnel. Minor modifications have been completed by personnel at the University of Michigan up to this point, but Elizabeth City State University has lacked a method of performing updates and modifications.

Unfortunately, due to design requirements of SGCI standards and software limitations, the team was not able to fulfill this task. In place of this goal the team proposed to analyze the current site and create or modify pages as necessary for future teams to add to the SGCI site when site access becomes available. While content was available for several pages, the team was required to research new material and create a survey to gather further information.

B. Overview

The team analyzed the SGCI site seeking first to create a flowchart and storybook of site pages. The opening page of the site contained over 70 links making this course of action too involved to complete. The team then chose to focus on what pages and links were needed for the Workforce Development section only.

Under the SGCI page **Service Areas** (https://sciencegateways.org/about/service-areas) three needs were identified:

- Mentoring
- Financial support for attending workshops and conferences
- Learning about gateway-related career paths

Under the SGCI page **Young Professionals Network** (https://sciencegateways.org/yp) four areas were identified:

- SGCI Young Professionals SPOTLIGHT
- SGCI Young Professional of the Year Award
- Young Professional Liaison to the SGCI Workforce Development Committee
- Networking Opportunities through Virtual Seminars

While not all pages identified were created, the following areas were assembled or researched for future development.

C. Mentoring

When SGCI personnel were contacted regarding future interns and mentors, they requested that resources be gathered to assist new mentors and interns as to what they should expect and how to succeed. The Science Gateways Team gathered over 90 links to sites that sought to encourage and inform those involved with internships. This group was reduced to 17 intern resources and 8 mentor resources through elimination of pertinent information. Some were too specific to a certain career field while others contained information that was too general.

The resources were then documented by source name, source URL, and description with the information being entered into a table.

Once this was completed, the team chose an SGCI page similar in construction to the intern/mentor resource list. The page contained multiple Cascading Stylesheet classes used to format the various "DIV" and "a" tags. These classes were added to the HTML code so that the developed code could be dropped into the SGCI pages and be implemented immediately.

D. Young Professionals of the Year

The Young Professionals of the Year award was presented to three individuals at the 12th Gateway Computing Environments Conference sponsored by the Science Gateways Community Institute (SGCI) which took place at the University of Michigan in Ann Arbor, Michigan. One of the parts of this award is "...a website highlight." This portion of the award has not been completed yet. The team took biographical information along with photos to create a model for the page to be created on.

E. Gateway Career Paths

"Learning about Gateway Career Paths" was a difficult topic to cover as there are no set educational paths to enter the Science Gateway development field. After discussion with SGCI personnel who have a great amount of experience in this field, it was determined that the team needed to collect information from those who have entered the field either through degree programs or through certification and ad hoc instruction for particular projects.

Given this need the team developed a large set of questions and reduced the number to 14. The survey questions were then implemented in a Google Docs survey form so that once a method of updating the site is developed, the form can be inserted and disseminated to a select group of individuals who are.

F. Financial Support

The Workforce Development service area supports individuals who present at conferences and attend workshops which contribute to the development of science gateways. The team developed a model for this page based on text supplied by Dr. Linda Hayden, the Workforce Development director.

IV. ANALYSIS

The primary goal of this project was to establish a method of updating the Workforce Development section of the SGCI site. While the team was not able to reach this goal, the groundwork was laid with the SGCI staff for beginning the steps to updating and creating content on the SGCI site.

The Science Gateways team identified several pages for future development and addition to the SGCI site. The four pages created for this project included: "Gateway Career Paths", "Young Professionals of the Year", "Mentoring", and "Financial Support."

Where coding was not applicable, content was gathered and arranged as a model for TACC developers. In this case, text and images would be supplied for a page to be developed as in the "Young Professionals of the Year award" page in the methodology section.

In other cases it would be feasible to develop the content utilizing HTML and CSS so that formatting could be completed on the Workforce Development side and handed off to the developers. This would speed up the process of development and give the Workforce Development more control of the display of the content.

Both of these cases involve having TACC or the University of Michigan update and create the Workforce Development pages. While this would be a secondary choice when compared to having the ability to directly edit and create the pages, it would still be beneficial to the Workforce Development service in order to develop the needed pages and modifications.

V. CONCLUSION

Modeling of pages under development is a basic tenet in website creation. Whether through coding or graphical methods, storyboarding is necessary to build a coherent site. The team project produced models and HTML files for future pages to be added to the SGCI site once a method of updating has been established.

The Mentoring/Internship Resource page was assembled utilizing HTML and CSS coding. Basic DIV tags replaced the use of a table formatting and allowed the use of previously CSS classes developed by the TACC developers. Sample CSS styles were substituted for SGCI classes in order to view the assembled code in a browser. This process worked well for this type of page which was formatted as a listing with embedded HTML links.

The Young Professional of the Year and Financial Support pages were developed using graphical models rather than HTML to capture the essence of what the page would look like once changes had been implemented. This process of developing graphical models instead of HTML pages was agreed upon when it became clear that the team had no way to directly implement changes to the Workforce Development section of the website.

The Gateways Career Path Page was primarily built around a survey intended for current gateways developers. The lack of a known career path based on the development of a gateway in and of itself lead the team to develop a large list of questions, which was then narrowed down to 14 key questions in order to determine the skills and knowledge needed to work on gateway projects.

VI. FUTURE WORKS

There are several projects that can be implemented by future teams. The first is a simple link addition from the "Networking Opportunities through Virtual Seminars" bullet on the Young Professionals page. SGCI has initiated a monthly webinar that fulfills the original intent of this subsection.

Another page to develop should be the "Young Professionals Spotlight." This page would highlight young professionals involved in science gateway development and education.

The survey for the Science Gateways Career Path should be implemented on a targeted audience. Results should be compiled and disseminated to students and educators to aid them in focusing their education and training on gateway development. This survey will most likely be implemented by the University of Michigan as they are currently connecting their Goggle Surveys to a database for collection of results.

In developing new pages, developers must also identify images for use as header images for the Workforce Development web pages. The dimensions of the images need to be identified by contacting the designers at TACC. The images can then be identified in the ECSU NIA photo library which contains images of SGCI conferences and workshops.

The highest priority will be continuing to work toward a working paradigm for updating the SGCI Workforce Development web pages. This may be in the form of supplying changes and new pages to a designer at TACC after a review by the SGCI staff or directly accessing the Workforce Development section of the site. Future coordination with SGCI will take place in the spring of 2018 and will involve not only the practical methods of updating, but ensuring that the updates are in line with the website direction.

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