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Transitioning from Marketing-Oriented Design to User-Oriented Design: A Case Study

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ABSTRACT

The transition to a new architecture and design for an academic library Web site does not always proceed smoothly. This case study describes the experiences of a library at a large research university that hired an outside Web development contractor to create a new architecture and design for the university's Web site using dotCMS, an open source content management system. The library participated in the design and development process along with other campus units. Because the university-wide process focused on marketing the university to prospective students, parents, and donors, the fact-finding process that the contractor used for the library's site design focused on how the design could incorporate Web 2.0 technologies. The outcome was a library Web site that showcased Web 2.0 technology more than it provided users with access to library resources. The library's users quickly communicated their dissatisfaction and confusion, which led to some immediate changes and a commitment to redesign the site based on expressed and demonstrated user needs. Therefore, the library hired another contractor to conduct iterative usability testing on both the new site and prototypes for a redesigned version. The testing outcome showed that Web 2.0 technology that does not meet existing user needs creates obstacles for both novice and experienced users. In collaboration with the university's information technology unit, the library developed and launched a revised Web site that helped users connect to the resources they need. This upgrade included the deployment of the Google Search Appliance to replace the native dotCMS search functionality. This case study demonstrates that libraries may need to advocate for different Web design priorities than those in practice at the university-wide level, and that working with outside contractors presents different challenges and opportunities depending on the contractor's hiring unit. These experiences also demonstrate that libraries can do a better job learning about their users when they lead the fact-finding process. Following these experiences, the library has made a commitment to conducting iterative usability testing on a regular basis.

KEYWORDS

academic libraries

content management systems

Google Search Appliance

university-wide process

usability

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Web 2.0

Web design

Web sites

INTRODUCTION

As much as librarians may wish mind-reading abilities were granted to recipients of the Master's degree, we still rely on communication with our users to develop user-centered Web sites. The expertise of librarians in adapting to human information-seeking behavior is certainly valuable in Web development; however, the process of user-centered design requires a stage in which the designers listen to what users tell them. Moreover, creating successful user-centered designs ultimately requires learning to understand what users cannot tell us directly. What the users say they want is not always what they find that they need.

The University of Akron is a large, primarily nonresidential, four-year public university located in downtown Akron, Ohio. Its mission is to develop enlightened members of society by offering comprehensive programs of instruction from associate through doctoral levels, pursuing a vigorous agenda of research in the arts, sciences, and professions, and providing service to the community (UA 2011). The university is recognized as a high research activity university by the Carnegie Foundation. University Libraries (UL) serve the main campus and are composed of three units: Bierce Library, the Science & Technology Library, and Archival Services. About fifty staff, contract professionals, and faculty members within UL serve the needs of our diverse population of users, often in coordination with administratively separate UA library units at the School of Law, Wayne College, and the Archives of the History of American Psychology. According to its mission statement, "The University Libraries provides state-of-the-art access to broad and diverse scholarly resources and innovative technologies to empower users to evaluate their information needs, identify and access reliable sources, and successfully transform information into knowledge" (UL 2010).

The University Libraries at The University of Akron launched its new Web site with the cooperation of the university's Information Technology Services (ITS) unit in early 2009, in coordination with a university-wide site redesign. This site, developed by a contractor using the open source content management system dotCMS (http://dotcms.com/), was intended to make it easier for users to search for and access library resources. The contractor had developed the design based on information gathered in informal focus groups of students, faculty, and library staff, and the newly-launched site included an appealing graphic design, dynamic generation of content, and Web 2.0 features such as commenting, rating, and tagging.

Unfortunately, the early feedback that followed the launch of the new site was primarily negative. Many of our users seemed to be frustrated and unhappy. It quickly became apparent that a redesign and relaunch would be critical in order to make our Web site a successful component of library services. Although informally we were getting an idea of what our users disliked about the new site, we needed to know why the site failed to meet the needs of our users, and what we should do to correct the problems. We decided to work with another consultant to conduct iterative usability testing on the site and propose redesigned prototypes. We hoped that formal usability methodology would provide us with a structure that would help us understand what our users need. We could then use this knowledge to

arrange access to library resources to better match user expectations, thereby helping them find the resources they need.

Because the libraries' Web site already included extensive customization to the standard installation of dotCMS, we prepared for some changes to require complex reprogramming, which we planned to address with the collaborative skills of both UL and ITS personnel. We also hoped that usability testing would show us some quick and easy ways to improve the site.

LITERATURE REVIEW

A review of the literature shows that elements of our experience at UA are not unique to our situation. This review includes topics related to coordinating and collaborating on Web development projects in a university-wide setting, using vendor-provided Web development services, selecting Web 2.0 features to incorporate into an academic library Web site, and conducting formal iterative usability testing.

There are examples of university-wide collaboration on information technology projects in the library professional literature. The University of Nevada, Reno Libraries developed a chat reference service intended to assist users with information about the university along with library research assistance (Curtis and Greene 2004, 220). Participating in a university-wide Web development process requires library personnel and information technology personnel to collaborate and coordinate in order to develop priorities, review documentation, and provide feedback on interim and final products. Andrea A. Coles and William Dougherty describe the themes of communication and culture that underlie successful collaborations in the university setting (2009, 110). These themes address methods to help organizations with different areas of expertise and internal cultures direct their efforts together to accomplish a goal.

Most coordinated efforts in university-wide Web development must address the question of whether to build the library site so that it has an appearance similar to the main university site, usually by using the university's Web template. According to a study conducted by Emmett Lombard and Lesley A. Hite, the librarians that are responsible for the library's Web site generally perceive the library as adequately serving its users within the boundary of its university's guidelines, but some believe that university guidelines interfere with effective service (2007, 65). Kate Peterson conducted a study on the Web sites of public and private doctoral, master's, and bachelor of arts institutions, and found that 34% of college and university libraries follow their university's Web site template for both the library homepage and the majority of the pages within the site, while 44% do not use the university template (2006, 218). Factors that affect the library's decision to follow the university template can include a preference for a unified look and feel across the university Web presence, a lack of Web development expertise to develop a different template, or even administrative requirements for the Web site.

Outsourcing Web development is not all that unusual. Maira Bundza, Patricia Fravel Vander Meer, and Maria A. Perez-Stable published a recent survey of Web services and public services librarians at academic institutions, which found that about half of the individuals surveyed reported that their library outsourced at least part of their Web development activities (2009, 251). This included working with campus units such as information technology departments and marketing departments. However, this

survey reported that only 10% of respondents used external assistance for a site-wide redesign, while 33% used external assistance for programming and technical support (Bundza et al. 2009, 252).

Although there is not a great deal of discussion of libraries participating in a university-wide Web site redesign in the literature, Tom Kmetz and Ray Bailey (2006) provide an excellent case study of the experience at Morehead State University, which involved working with a vendor at the university level to implement a proprietary content management system. They found that the vendor did not anticipate the level of traffic that academic Web sites experience, a problem that resulted in several false starts for the formal launch of the new site (Kmetz and Bailey 2006, 106). However, they concluded that working with a vendor ultimately provided them with a system that met the needs of the library and the university as a whole (Kmetz and Bailey 2006, 113).

In the current Web environment, design processes must consider the array of interactive Web technologies, commonly referred to as "Web 2.0," which are available to deploy on a new site. The Library Information and Technology Association's Internet Resources and Services Interest Group hosted an "Ultimate Debate" at the 2009 American Library Association Annual Conference to answer the question "Has Library 2.0 Fulfilled Its Promise?" The experts who discussed this topic agreed that participative and interactive tools deployed in libraries usually must fulfill existing needs of the library's audience in order to succeed (Arch 2010, 370). Features can also fail without sufficient staff support, and library personnel need to understand tools in order to implement them and explain them to their users. Additionally, library personnel who are consulted in the design process often become more supportive of the new Web site (MacMillan et al. 2007, 431).

Choosing Web 2.0 features to include in library Web sites can be an exciting task because of the interest in interacting with users and providing features that will showcase the library as a center of technological expertise and engagement. Librarians recognize the need for adding interactive features that may go beyond instant messaging reference and blogs to create more opportunities for user interaction (Bundza et al. 2009, 255). However, it is entirely possible for Web sites to go too far in deploying Web 2.0 features. In the Web development community, it is recognized that Web site features should support core services without making the interface difficult for users to understand (Neilsen 2007).

Formal usability testing is becoming a standard component of library Web design and development. A survey of members of the Association of Research Libraries, conducted by Yu-Hui Chen, Carol Anne Germain, and Huahai Yang showed that 85% of those responding performed some type of usability testing (2009, 957). Seventy percent of the responding ARL libraries reported using only library resources to perform testing and interpret the results, while 25% obtained assistance from another unit at the university, hired an outside consultant, or both (Chen et al. 2009, 962). A separate survey that focused on Web services and public services librarians reported that around 75% conduct usability testing, most frequently carried out by the Webmaster, Web team, or Web committee (Bundza et al. 2009, 253). The Art, Architecture, and Engineering Library at the University of Michigan worked collaboratively with the usability and evaluation lab on campus. They noticed that their consultant brought unbiased knowledge and expertise, but needed a great deal of communication with the librarians to understand both content and user behavior (Tolliver et al. 2005, 165).

The survey conducted by Chen et al. found that few libraries conduct iterative testing (2009, 964). Iterative testing can find misinterpretations of user needs and capture changes in user needs over time. Laura Cobus, Valeda Frances Dent, and Anita Ondrusek (2005, 235) describe an iterative model of conducting usability testing in rounds in order to test changes made due to the findings of prior testing. This model addresses the fundamental rationale of usability testing: to learn how to make changes that best serve the needs of the users.

BACKGROUND: UNIVERSITY-WIDE COLLABORATION

Before discussing the usability testing we conducted, some background on the university-wide information technology environment and Web design process will provide context for our experiences. The UL Web Development Group, created around 2005, has a revolving membership of interested library faculty, staff, and contract professionals. Current membership includes the Electronic Resources Librarian, the Applied Sciences Librarian, the Government Documents Librarian, the Coordinator of Library Systems, the Audiovisual/Special Materials Cataloger, and the Web Development Specialist. The libraries' Web presence is managed by the Web Development Group in coordination with the UA Web Team, which is part of ITS. The relationship between UL and ITS is intended to be cooperative and collaborative at both the administrative and implementation level, with the UL Electronic Resources Librarian acting as the primary liaison with the ITS Application Services Technical Lead. The final responsibility for the functionality of the site belongs to ITS, while the administrative units such as UL have the final responsibility for the content of the site.

Around the time of the creation of the libraries' Web Development Group, it had become clear to UL that its Web site, based on static HTML pages and a homegrown CMS, needed to be redesigned to meet the needs of the libraries' users. At the same time, UL had begun to explore the development of a Learning Commons for Bierce Library. The goal of a Learning Commons is to provide an environment that supports library users in effectively accessing and using library resources in all formats, particularly electronic. While redesigning the physical space and the information services model remained the primary focus of the Learning Commons project, everyone agreed that modernized and improved access to the libraries' electronic resources would be an essential component to the success of the Learning Commons.

In 2006, the UL Web Development Group began to research a number of open source and proprietary Web site content management solutions. During this process, the UA Webmaster contacted the individuals involved in this research, indicating that he was leading an effort to redesign the university's Web site, and inviting library personnel to work with a Web Committee that was charged with selecting a solution to bring the university's complex and varied Web sites and Web content onto a single platform. The Web Committee included representatives from ITS, Institutional Marketing, Student Life, Admissions, and the Registrar.

This arrangement provided for a single university-wide platform for which ITS would provide technical support while the participating campus units, including UL, would provide content. The libraries' Web site is one of the most complex in the university's organization, which provided the redesign and

deployment effort with a substantive pilot project. An academic library's Web site is a microcosm of the university's, with multiple audiences and several departments that have different requirements and expectations for their Web presence.

Therefore, the libraries successfully negotiated to be the first major component of the site for development and launch. In addition to giving our unit specialized attention from the contractor, this decision demonstrated the libraries' willingness to be an early technological adopter, a fact that we hoped would continue to contribute to the libraries' increasing level of visibility in the campus-wide technological infrastructure. The literature shows that libraries benefit from exposure that demonstrates their expertise with information technology (Curtis and Greene 2004, 229). The inclusion of library personnel in the campus-wide process is also a recognition of the expertise of library personnel in users' information-seeking behavior and in Web technologies to meet the complex needs of library Web users. Given the complex functional needs of the libraries' Web site, we also agreed to test all of the dotCMS functional components that would be deployed in our portion of the site.

Marketing plays a significant role in university Web development. From the beginning of the project, the university determined that the primary audiences for its site are prospective students, parents, and donors. In contrast, the libraries' primary Web site audiences are enrolled undergraduate and graduate students, and faculty, instructors, lecturers, and staff members. This difference in focus resulted in challenges during the planning process. For example, the Dean of University Libraries ultimately provided the advocacy push needed to have a link to the libraries' site prominently displayed in the university's main navigation bar. Because of the administrative intent to use the site as a marketing tool, this success initially resulted in a landing page designed to market UL, rather than a page designed to provide library users with easy access to library resources. We were later able to make a case for the link to go directly to the libraries' home page.

BACKGROUND: WORKING WITH A WEB DEVELOPMENT CONTRACTOR

Our university's decision to outsource the design and development of its Web site, including the libraries' portion of the site, puts us in company with about a sixth of the libraries in the Bundza et al. survey; however, only 10% of the libraries surveyed relied on contractors for a complete redesign (Bundza et al. 2009, 252). UA's decision to outsource the redesign process was motivated by the complexity of the plethora of Web application platforms that existed throughout campus. In order to make the site easier for ITS to support, the pieces needed to be migrated into a single, campus-wide system. Rather than developing in-house expertise to build the site architecture from scratch, and then deploy and configure a content management system from the ground up, UA made the determination that it would be more cost-effective to hire a contractor.

For the redesign process, UA selected dotMarketing, a company that had been developing a specialization in working with not-for-profit and academic institutions. This firm's response to the university's request for proposal demonstrated a clear understanding of the decision-making process in academia. We were the firm's first large academic client; all other academic institutions for which the company had previously developed and deployed a Web site were significantly smaller.

The original RFP requested a campus-wide architecture and site redesign. For the design process, dotMarketing developed its sites in dotCMS, its open source CMS. Although dotMarketing could move the site to other content management systems, UA needed a new CMS because the legacy university site relied on a homegrown CMS that had been developed in 1999. ITS determined that dotCMS would be a powerful tool that could be used as a development platform while it stored and displayed university content. Therefore, in addition to creating the new UA site architecture, dotMarketing was also contracted to implement dotCMS Enterprise and customize the application to serve UA's needs.

BACKGROUND: GATHERING INITIAL USER INPUT

As part of its planning process for UL's portion of the new Web site, dotMarketing agreed to conduct focus groups. As Sarah Bordac and Jean Rainwater observed, focus groups can provide insights on how the library Web site functions as a tool for users (2008, 121). Before convening library user focus groups, the contractor met with staff in Summer 2007 to demonstrate and discuss the concept of reusable content, and to demonstrate potential Web 2.0 functionality for the site design. Beyond gaining support for the planned shift to reusable content, the rationale for meeting with library personnel was also to learn from their experience with users' information-seeking habits in public service areas and on the Web site; however, relying too heavily on librarian input can turn out to be a drawback because librarians may misinterpret user preferences.

In Fall 2007, the contractor met with a group of students from the Associated Student Government, and a group of faculty members from the Faculty Senate Library Committee. Both groups were chosen because they represent the most frequent library users: highly-motivated undergraduates and experienced faculty researchers. These presentations demonstrated several dotCMS features with Web 2.0 functionality. No substantive records were kept of these conversations, and no calls were put out to obtain feedback from a representative sample of other library users.

As a result of these informal conversations, our site design included a feature that allowed users to comment on and rate resources such as databases and electronic tools, and another feature that allowed users to locate resources for researching particular topics using a librarian-constructed tag cloud. Both of these features are user-driven and collaborative tools that fall under the umbrella of "Web 2.0" as defined by Sodt and Summey (2009, 98). However, as our later usability testing uncovered, these features did not address existing needs of any of our users – even the groups who had participated in this discussion process.

BACKGROUND: THE DEVELOPMENT AND DEPLOYMENT PROCESS

Beginning in 2007, the contractor reviewed the content on our legacy Web sites and undertook a fact-finding process, discussed below, that focused on the expressed needs of students, faculty members, and librarians. Based on these conversations, the contractor developed an information architecture plan in Spring 2008. This plan included two components: a wireframes document that illustrated the basic structure and navigation of the proposed Web site and defined essential relationships among its pages, and a functionality requirements document that defined the technical requirements and the explicit

behavior of the Web applications. In essence, the functionality document is the design requirements document: it says what the system should do, and thereby acts as a set of goals for the programmers.

After making changes based on library feedback, the contractor finalized the wireframe and functionality documents in July 2008 so its programmers could begin constructing Web pages. Meanwhile, UL personnel reviewed the content on the legacy Web site to eliminate unnecessary material and ensure the currency of the information prior to its migration. This allowed library personnel to view the information in the setting to which they were accustomed, and minimized the amount of unnecessary content that was moved to the new site.

The contractor's planning process did not anticipate the complexity of the proposal they had agreed to, nor the amount of time it would take to complete the project. While the initial timeline had been to launch the site in August 2008, the contractor was unable to meet the deadline. In September 2008, the contractor made portions of the beta version of the Web site available on a development server. We selectively entered content and reviewed functionality as it became available, while keeping the contractor apprised of issues as they were encountered. ITS moved the beta Web site from the development server to the production server, where the legacy site and the new site ran in tandem. UL posted a link to the new site on the legacy site in order to get feedback from interested users. With the beta site on the production server, we migrated the remainder of the libraries' content. Although the site was technically operational in late October 2008, we felt strongly that the Web site transition should not take place in the middle of a semester. Therefore the two sites ran in tandem operation for two months until we retired the legacy site at the start of the following semester in January 2009.

Shortly after the conclusion of our project, the contractor went out of business. During the final stages of our site deployment, the contractor removed the project manager who had been responsible for overseeing the development of the UL site, replacing her with two project managers who were given the task of finishing up the details. Changes in personnel led to difficulties in communication, and the project was eventually concluded without all of the appropriate bug fixes in place. While dotCMS continues to be developed by dotCMS, Inc., we no longer have the support of the contractor that developed our Web site. Future bug fixes and functionality changes became the responsibility of ITS.

Although a preview link had been made available to the libraries' Web site users for several weeks in late 2008, most of the feedback we received came after our hard launch in early 2009 when all libraries' Web site users needed to adapt to the new site. Public service units within the libraries were asked to compile the informal feedback they received as they interacted with the university community, and submit these comments to an assessment subcommittee of the libraries' user interfaces committee. This committee took the comments received from several dozen individuals, including several lengthy comments from a Web-based feedback form, and compiled a summary.

To our dismay, the majority of the feedback was negative in some way. Experienced library users, including many faculty members and upper-level students, could no longer locate resources they used on a regular basis. Many who had previously demonstrated library resources in classrooms or required their usage in assignments did not feel comfortable continuing to do so. Meanwhile, inexperienced

library users encountered at the reference desk in person, by phone, or by instant messaging were overwhelmed by the site and could not discover what they needed to locate resources or complete assignments.

We expected some confusion, since there had been no significant changes to the architecture of the libraries' Web site since 1998, and the architecture of the new site differed substantially from the old. However, the degree of unhappiness our users expressed came as a surprise to us. To understand this feedback, we met with the Faculty Senate Library Committee and the Associated Student Government again to discuss the new site. Although different individuals served on these committees from when dotMarketing had solicited feedback a year ago, their perspectives still represented a fairly small segment of our users, and could not in itself give us definitive solutions.

Along with ITS, we were able to make some initial changes to address important issues uncovered in these discussions. However, these sessions and further feedback warranted investigation using formal usability testing. While hindsight suggests that conducting such tests prior to the initial design of the site may have prevented some of the issues we uncovered, we still had the opportunity to learn from our experiences through iterative usability testing.

USABILITY TESTING METHODOLOGY

Following the launch of our new Web site, we determined that formal usability testing would be necessary to determine how to regain the confidence of our users, which we felt we had lost with the new design. While we decided to work with a contractor again, we did so with the goal of actively participating in the testing process.

Our work with dotMarketing had put us in contact with decimal152 (http://www.decimal152.com/), a Web design consulting group. UL contracted with decimal152 to lead our usability tests on our dotCMS Web site. The consultants specialized in working with non-profits and academic clients, and had extensive personal experience with academic libraries, although we were their first library client. Additionally, the consultants had previously worked with dotCMS, and understood many of the strengths and limitations of the system. We agreed to perform two rounds of usability testing with our users, including students and faculty members. This iterative testing process eventually allowed us to test the consultant's suggested changes.

Finding a location for testing proved to be easy. Our campus has a usability testing lab built and maintained by the University of Akron's Taylor Institute of Marketing, and partially funded by ITS. This provided a perfect forum for the consultant to run the tests. A Web developer from ITS used Morae, a software package developed by Techsmith (http://www.techsmith.com/morae.asp) to record screen captures along with video and audio of the test participants. Library personnel could view the live tests through a window with one-way glass. After the tests, those who could not attend the live tests could view the video recorded during the tests.

The consultant facilitated a task-based test using topics of interest to the participant, while ensuring there was adequate time for each task. The libraries sent out an open call for test participants to fill

available time slots, and ultimately recruited four undergraduate students, one graduate student, and nine faculty members to participate in individual 45-minute long testing sessions. Although not fully representative of our campus, these individuals came from a wider variety of departments and programs than those who had participated in the earlier informal focus groups. At the beginning of the test, a brief interview took place to determine the subject's area of interest. The testing scenario asked the subject to perform tasks based on her/his area of interest starting from the main library page such as finding a book, finding an article, answering questions about library services, and locating librarian contact information. Following the test, the subject answered questions about whether they would be likely to use the site's Web 2.0 features to rate and comment on resources. The subject was also asked to discuss her/his preferences for different layouts presented as paper prototypes. The full test is included as an Appendix.

Throughout the test, the subjects were encouraged to describe aloud any difficulties they experienced. When they found themselves at a dead end, they were asked about the steps they would consider taking next. This testing procedure, known as a think-aloud protocol, gives insight to the processes participants use to solve the problems they encounter. When this information is added to nonverbal cues such as facial expressions, and the analysis test subjects themselves provide, the usability testing group can gain a better understandings of the strengths and weaknesses of the site.

The consultant conducted the first round of usability testing in April 2009 using both the initial release of the new Web site and a few paper prototypes for an improved version of the Web site. The test results listed problems that users found, from which the consultant developed a report describing the needs of the users and wireframes of a proposed revised Web site. The report specified several components of the site that needed improvement, and described minor design issues that could be quickly corrected, along with other issues that would require extensive programming to change elements that could not be configured within the dotCMS system.

Based on the usability report and wireframes, ITS developed a working prototype that incorporated feedback from librarians and other content stakeholders. Following a model similar to the one suggested by Cobus et al., the consultant conducted a second round of usability testing in late June and early July 2009 using the same testing procedure on the newly developed prototype hosted on our development server (2005, 235). For the second test, the libraries again put out a call for participants, and recruited five undergraduates (including one who had participated in the first round of testing), one graduate student, four faculty members, two staff members, and one individual with both faculty and staff status. The second report indicated only minor adjustments to the revised design.

We found the process to be very informative, and in Spring 2010 we hired the same consulting firm to assist us with testing a redesigned version of the UL Archives Web site. The consultant acted as a liaison throughout the process, helped to build the testing scenario, and then held a seminar for UL and ITS personnel to teach us how to analyze and interpret the results of usability testing to create a usability recommendation document. Our university's decision to develop in-house expertise for usability testing puts us in company with many other institutions. However, our approach of working with units outside the libraries, including hiring a contractor and using equipment provided by another unit within the

university, puts us in the minority in the Chen et al. survey (2009, 962). We have since taken responsibility for performing iterative usability testing on all portions of the UL Web site.

KEY FEATURES OF INITIAL WEB SITE

Before reviewing and discussing the findings of the usability reports, it is necessary to provide some background about our Web site as it was originally designed and launched. All dotCMS sites contains pieces of content, or contentlets, which are assigned to specific categories within structures.. The most significant component of the libraries' site is the collection of Research Tools, which includes electronic databases and indexes, Web sites, and other tools that are accessible online. Each Research Tool contentlet includes a resource title, URL, description, and manually-assigned keywords. Content authors access and edit these fields in dotCMS using a Web form-based editing system. These contentlets are are intended to guide users to resources that meet their research needs.

Like many libraries, we want to adapt our Web technology to provide better services to our users, including the creation of virtual spaces that assist our users in collaborative efforts (Sodt and Summey 2010, 99). Based on the findings of the Web development contractor, users had the option in the initial release to rate resources and sort by ratings. The system also included functionality supporting moderated comment submission, with the vision that students and professors could make comments that would help other users determine which resources would be most helpful for specific research needs.

The landing page for the libraries' Web site featured a tag cloud with popular Research Tools tags. Librarians assigned tags to contentlets in order to collocate resources and supplement the information already included in the description field. While the tagging field in the contentlet featured an autocomplete function, it did not support a controlled vocabulary. Additionally, because of the limitations of the native dotCMS Enterprise search function at the time, each potential search string had to be included in the keyword tag or description fields. For example, a resource that can be used to look up Congressional roll call votes needed to have "roll call", "roll-call", and "rollcall" in the tag field in order to account for common variations in terminology that might be used as search strings.

USABILITY TESTING RESULTS

Issued in May 2009, the first round of usability testing results and recommendations showed us that the initial Web site design did not account for common variations among library users in background, expectations, and expertise (UAL 2009a, 1). While we had agreed to include functionality that the groups our Web design contractor consulted had approved, many of these features were neither designed nor deployed to solve existing user problems. Instead, they confused novice users while providing barriers to knowledgeable users. The technology itself was therefore intruding on the user experience, an issue that library technology experts have identified as a potential pitfall for libraries adopting new technologies (Arch 2010, 370).

Several of the 32 problems identified in the usability reports involved content changes or other changes that could be quickly implemented. For example, users do not read large blocks of text, so those needed

to be moved from the main page (UAL 2009a, 5). The original color scheme UA chose included blue text on light blue background, so ITS changed the cascading style sheets to improve the contrast (UAL 2009a, 28). Links within text now appear in dark blue, but change to lighter text with an underline when the user hovers over them.

The think-aloud testing protocol showed us that when users cannot find the information they need, they would like to talk directly to a human to resolve their question. Although many of our users are very comfortable with technology, some are not, and overall, they expressed a preference to communicate by phone rather than through our existing instant messaging feature. Therefore, we added frequently-requested phone numbers to our footer (UAL 2009a, 10).

We also learned that when users are confused, they want to quickly return to their starting point. Therefore, we modified the appearance of the university's header so that users could click the University Libraries masthead to return to the libraries' main site, rather than clicking the University of Akron masthead to go back to the university's home page (UAL 2009a, 2).

Other Web site issues reflected a lack in users' information literacy skills. Both novice and expert users will put nearly any search string in any textbox available regardless of the description accompanying the textbox (UAL 2009a, 3). In particular, they will often perform searches using specific terms that would be appropriate for locating an article within a database, without regard for what the textbox searches. We informally referred to this tendency as an abuse of textboxes, although we suspect it pains us more than it does the textbox.

As a result, we decided to remove widgets for searching the libraries' catalog, the libraries' electronic resources, and the consortium catalog from the libraries' home page (UAL 2009a, 3). A single search box for discovering databases and tools was relocated to a secondary page (UAL 2009a, 4). This did not completely eliminate the misuse of textboxes because the university's template includes a search box in the header, but it removed some opportunity for error.

The second report, issued in July 2009, reviewed the results of the second round of usability tests that followed deployment of some of the major changes. While some of the more complex changes had yet to be completed, the report found that the new version improved efficiency for the user. This report also found that asking users to develop new habits and preferences requires continual conversation and education (UAL 2009b, 1). In a new environment, users make adjustments based on the elements in place that match their existing intuitions. Therefore, our changes needed to better match our users' intuitions.

Many of the recommended changes involved significant reprogramming of the site. These included substantial changes to the subject guides and to the faceted searching feature of the libraries' collection of databases and other electronic resources. We accomplished these complex changes with university resources, using ITS expertise in programming and UL expertise in user information-seeking behavior and expectations. To facilitate planning and communication, ITS created an issue tracking system using Microsoft SharePoint (http://sharepoint.microsoft.com/en-us/Pages/default.aspx). Functionality requests and bugs could be identified and described with supporting material such as screenshots. In

many cases, a Web developer and a librarian collaborated using instant messaging to test changes as they were made to the development server, while in other cases, UL personnel would put new functionality to the test. Several of us developed substantial skills in Web testing, often breaking functionality nearly as quickly as it was made available to us.

Another component to facilitate working with ITS was face-to-face time at monthly meetings, which helped establish clarity on the project's timeline. We found that establishing both formal and informal direct communication opportunities helped us bridge differences and track progress throughout the development and testing process, a theme recognized in other collaborative projects (Coles and Dougherty. 2009, 110). Additional meetings between the UL and ITS administrators affirmed priorities and resource allocation decisions.

The remainder of this article focuses on two areas of changes in response to the usability test findings: removing Web 2.0 functionality and deploying the Google Search Appliance to improve search capabilities.

WEB 2.0 CHANGES

Some of the most surprising findings in the initial usability test involved features that had been quite popular during our initial design focus groups and feedback sessions. In particular, features that offer popular Web 2.0 functionality such as commenting and rating proved to be distracting and unhelpful. While this topic remains, for the most part, unaddressed in formal literature regarding usability testing, practitioners in the usability community have recognized that user-generated content requires a critical mass in order to function successfully (Neilsen 2007).

Our tag cloud on the main page had been intended to show users the prevalence of specific keywords within our librarian-created database of research tools such as databases and Web sites. Tag clouds displayed with font weights that indicate the prevalence of a specific term are effectively deployed on some popular Web sites; however, our users did not find this feature helpful for discovering library resources, and they refused to use it (UAL 2009a, 5). Some users even expressed substantial dislike for the inclusion of this feature. In order to free up valuable real estate on the Web page, the landing page redesign removed the tag cloud.

During the five-month period in which we had user ratings enabled on the Web site, very few resources were rated (UAL 2009a, 11). The few that had been rated had ratings that seemed to be haphazardly chosen, and the feature never came close to getting the critical mass of usage that can make ratings helpful. Also, the default of zero proved to be problematic: some users in the usability test thought that a rating of zero reflected negatively on a resource (UAL 2009a, 11). Meanwhile, while our Web site functionality included support for user-created comments, the three comments submitted for moderation were inappropriate and never published.

In our usability tests, all of the test subjects agreed that librarian-selected resources would be more effective in providing a starting point for users (UAL 2009a, 7). We replaced the system of ratings with one in which librarians can mark the resources that are particularly good for starting research; these

resources can be easily located with the search functionality. We eventually discovered that librarians also preferred this system because it gave them more control in how information on the site is presented and helped them instruct users about library resources using the Web site (Arch 2010, 370).

Even before conducting usability tests, UL and ITS developed and launched a landing page accessible from the university's main navigation bar to present users with links to frequently requested resources instead of marketing copy related to the library. We had no reason to wait for the usability report, because the need for such a page was clearly and repeatedly demonstrated throughout the initial tests. Our design process ultimately developed a modified version of the university template, with adaptations to the header, footer, and navigation tabs for better access to library content. This puts us in company with the 76% of libraries in Peterson's survey that use a modified academic template for top navigation (2006, 218). The Peterson study reports that a significant advantage to using the university template is access to the Web design experts at the university level; fortunately, we were able to leverage university-level expertise while designing a template focused on library content (2006, 219). Removing rankings, comments, and the tag cloud returned the site to serving experienced users and removed elements our novice users described as confusing and unhelpful throughout the testing process.

SEARCH CHANGES - GOOGLE SEARCH APPLIANCE

Another significant set of changes prompted by the usability tests relates to the presentation and function of the site's search tools. In the initial release of the Web site, the main page included four search boxes: one for the Research Tools content, one for the libraries online public access catalog, one for the libraries' SerialsSolutions e-journal finder (http://www.serialssolutions.com/), and one for the OhioLINK "QuickSearch" tool (http://www.ohiolink.edu/), which searches the statewide consortial catalog, the statewide electronic journal collection, and EBSCO's Academic Search Complete (http://www.ebscohost.com/academic/academic-search-complete). This was in addition to the site search box in the header that the university template requires. Following the usability report, three were removed: the libraries catalog search box, the e-journal finder, and the OhioLINK "QuickSearch" box. The fourth, the Research Tools search, was relocated to a secondary page (UAL 2009a, 4). We made this change because we found that users tend to enter text into search boxes indiscriminately. Users now use the links on the home page to navigate to the type of search they need, before being presented with a search box.

From the usability testing, we discovered a significant problem with the search box access to our collection of Research Tools, which are links to databases, Web sites, and other electronic resources that include descriptive text written by librarians. The intention of the search is to help users find Research Tools that they can use to then locate articles, data, or other information sources for their assignments and research. The search mechanism provided in the original dotCMS configuration did not function as our users expected, with limitations to the capacities of the search logic functionality and the truncation and stop words functionality, and the lack of a relevancy ranking.

The search function included in dotCMS could not be configured to meet the criteria described in the usability report. In its place, ITS deployed a Google Search Appliance

(http://www.google.com/enterprise/search/gsa.html), which offers custom data feeding, phrase searching, stemming, and spell checking, and features the ability to sort results by relevancy ranking. GSA also searches a great deal faster than the native search available in dotCMS, in part because Google's proprietary algorithms access an XML index of the data instead of directly communicating with the database.

The GSA must have access to data from the dotCMS system in order to create an XML index. ITS created a PHP script to construct an XML document in the GSA Document Type Definition feed in order to extract the appropriate data residing in the dotCMS database. A Python script pushes the feed to the GSA. The GSA data is automatically refreshed on a regular basis using a time-based job scheduler that triggers the PHP and Python scripts. The user interface of the Research Tools search results is dynamically assembled based on returned search results using a combination of jQuery, HTML, and CSS, so the user sees filters applicable to the set of results returned to her. Furthermore, if the user enters a misspelled word, the RTS interface will display a set of suggested terms as with Google's "Did you mean... ?" feature. Optional alphabetization of search results gives the user more options in reviewing the results.

Implementing the GSA made the librarians' work easier, even as it helped us meet user expectations. Librarians no longer need to write the title and overview in a specific way to ensure that the resource appears in the search results, because the search is now more powerful and flexible. Now the content authors can focus on explaining Research Tools, instead of fretting over whether the user will be able to find them.

DISCUSSION

Any type of collaborative project, whether with another unit within the university structure or with an outside contractor or consultant, has the potential to result in great accomplishment or colossal failure. Collaboration includes an element of releasing control of the process and outcome to another party with different goals and priorities. In the case of a successful collaboration, the groups involved can contribute their expertise and efforts in a focused way to produce a better product, often more quickly than if the units acted alone. Similarly, a successful consultant or contractor experience allows the contracting party to focus on deploying its expertise where it matters most.

Our experience with working with a Web development contractor was decidedly mixed. Although the contractor was sufficiently familiar with the CMS they implemented for their development process to proceed quickly, they had to adjust to a complex organizational structure and robust functional requirements. While UL was the pilot site for the university-wide redevelopment, our needs were so complex that the timeline for deployment was eventually revised and we lost our privileged position in the university's roll-out process. The university's focus on the Web site as a marketing tool was reflected in its template and site-wide design, and the libraries needed to address this priority while meeting our own organizational priorities (Lombard and Hite 2007, 66).

Additionally, we discovered that our contractor was not an expert in helping our users. While a traditional Web site in the corporate or non-profit world is structured to help users explore content and stay on particular pages, an academic site, particularly a library site, should be designed to quickly get

users to the resources they need. In order to be successful, the developer must understand user behaviors rather than user preferences. As librarians, we want to learn about what our users need, as demonstrated by a combination of user preferences and user behaviors. A marketing approach that gauges interest in exciting technological features will not tell us what we want to know. Only after the process was well underway did we realize that we needed to focus on user information-seeking behavior in order to ask the right questions.

Kmetz and Bailey expressed the opinion that more libraries would transition to commercially available and vendor-provided content management systems, "after the CMS vendors have picked over the low-hanging fruit of large corporate customers and begin to perceive academia as a viable market" (2006, 103). Our experience with a commercial contractor who was hired to implement an open source content management solution showed us that at least some vendors who are within financial reach of academic institutions are still not prepared for the complexities of academia. The observation that universities tend to be significantly more complex than similarly-sized companies still holds true, and perhaps vendors that might ultimately be successful in the academic market have not yet transitioned from the corporate market (Kmetz and Bailey 2006, 103).

Our experience working with a contractor for usability testing was significantly more successful than our experience working with a contractor for Web development. While some of the differences may simply be inherent to working with different companies on different projects, the success of the second experience traces back to several factors. First, we worked with the usability testing contractor primarily at the libraries level instead of the university level. Therefore, we were able to take the leadership role on the project requirements, which put the project focus on the libraries portion of the Web site rather than the site as a whole. While working on the site design with the university's team provided the libraries with access to resources and expertise in the ITS department, it also meant that UL did not have the final decision authority through the process. This became an issue when the needs of the libraries' primary audiences differed from the expectations for the rest of the university's site. Our work with the Web development contractor resulted in a marketing-oriented design, while our work with the usability contractor resulted in a resource-oriented design.

Another reason that the experience with the usability contractor had a successful outcome is the investment in education that the libraries made as part of the process. While the Web development contractor led the libraries to begin training personnel to work with dotCMS, other aspects of the contractor's responsibilities were treated passively. For example, the informal focus groups conducted by the contractor were not rigorous or multi-dimensional, and primarily gathered information about interest in certain Web 2.0 features. In retrospect, the libraries should have conducted focus groups that explored the needs and requirements of a variety of user audiences, rather than simply gauging interest in individual features without adequate context. In contrast, the work with the usability contractor ultimately included an educational component in which library personnel learned how to conduct and interpret a formal usability test. As the librarians at UM's Art, Architecture, and Engineering Library learned, librarians can use the expertise of consultants to create a reusable testing structure that can then be adapted to appropriate content for each test (Tolliver et al. 2005, 165).

While librarians encounter daily reminders of the diversity of our users' experiences and background knowledge, not every problem reaches the attention of the Web designers and developers. If a user finds the Web site to be frustrating, she may end her search without finding the best resources for her information needs. We need to equally serve the experienced and inexperienced users, and consider both the outspoken and the reticent voices. By meeting only with the Associated Student Government and the Faculty Senate Library Committee, our contractor failed to bring average users into the decision-making process. Our usability contractor, who was more familiar with academic libraries, performed formal testing with volunteers from different campus backgrounds, and facilitated the tests based on the areas of interest of the test subject.

New technologies can be interesting, but they create distractions when they do not have a defined audience and a desirable function. In the case of our Web 2.0 commenting and rating features, for example, we did not anticipate that users would prefer to learn about resources from librarians instead of each other. Our tag cloud presented an overwhelming number of tags, and led users to the topics with the greatest number of tagged resources. Our usability testing showed us that users want to know which resources are best for their topics, and this feature as it had been deployed did not answer that question. Functions that do not fulfill the existing needs of users should be removed entirely rather than neglected and left to confuse users (Arch 2010, 370).

Another important lesson to our institution has been the importance of the enterprise search. Users who do not know what to do will enter text into any search box they can find. Therefore, the search engine needs to be robust and deliver results that will guide the majority of users to resources that help answer their questions. Good descriptions of database content still require intuitive search access. At some level, too, there is no substitute for good information literacy skills. There is always a role for librarians and instructors to improve our users' ability to understand the information presented to them.

CONCLUSION

Just because new and interactive technologies are deployed successfully on other Web sites does not mean that every user population will want or understand them. While the users our Web development contractor consulted expressed enthusiasm about functionality such as tag clouds, user ratings, and comments, the users in our iterative testing process found them to be frustrating obstacles to information access. Common usability practice indicates that technology must make sense immediately, but Web site users cannot always verbalize what they really want. Testing prototypes provides the link between the ideas that excite our users and the implementations that our users intuitively understand.

University Libraries has formed an assessment team to evaluate the libraries' user interfaces and conduct future usability studies. This team has developed and deployed a survey of a representative sample of our user population to identify areas that should be included in the next round of usability testing. Because both ITS and library personnel have been trained in performing usability tests and translating the results, our testing will be more cost-effective and can be as frequent as we need. We have also made a long-term commitment to continued efforts to improve our Web presence by hiring a full-time Web Development Specialist who brings programming expertise directly into the organization.

Usability testing is now the foundation of the libraries' Web site changes. Moving forward, we hope to continue to bring our Web presence into better alignment with our users' expectations.

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APPENDIX: WEB SITE USABILITY TESTING PROTOCOL

INSTRUCTIONS

I'm going to present you with some basic scenarios for finding information on the UL Web site. I would like you to complete the task as you would in your natural environment. As you are browsing the website, I would like you to "think aloud" by describing what you're looking for, what you're thinking about, why you are making the choices you are, what you expect to find by clicking a link, etc. Please share any impressions, likes, dislikes or frustrations.

If you reach a point where you would normally give up or use another method to get the information, please let me know.

We will be recording this session and there may be an observer from the library in the other room. You are not being judged in any way: we are observing your experience to find ways to improve the library website.

Do you have any questions?

Before we begin, I have a couple of questions about you that will help focus our search scenarios.

(Faculty pre-testing interview questions:) What topic/field do you most often conduct research in? Do you have a particular resource/database you use often? What is it?

(Student pre-testing interview questions:) What is your major? What is a topic you are currently learning about in one of your courses?

TESTING SCENARIOS

FACULTY SCENARIO

1. Find a book on [research topic]
2. Request an item through interlibrary loan
3. Find an article on [research topic]
    a. How do you get a copy of this article?
    b. Can you get electronic copies of library documents delivered to you? How?
4. How would you determine the best database to use to research an unfamiliar topic?
5. Place an item on reserve for your students.
6. Contact the subject librarian for [subject area]
7. Find the library hours
8. Get help accessing library materials from off-campus

STUDENT SCENARIO

1. Find a book on [research topic]
    a. Who do you contact to get information about checking out a book?
2. Find an article on [research topic]
    a. How do you get a copy of this article?
    b. Can you get electronic copies of library documents delivered to you? How?
3. How would you determine the best tool to use to research [major topic]?
    a. After choosing a resource, is there a tutorial for this?
    b. How would you save/keep track of this item for future use?

4. Find the library hours
5. Get help accessing library materials from off-campus
6. Find out how to check out a library laptop
7. Locate information about the writing lab
8. Contact a librarian for help
9. Locate an item in course reserves

POST-TESTING DISCUSSION

1. Did you notice the resource ratings and comments? Would you be likely to rate or comment on a resource?
2. Discuss paper prototype options.
3. Discuss “Expert Mode” setting option.
4. Discuss “Not Sure” page with advanced search option to expose other search parameters.
5. Discuss preferences for various layouts.