Theodore Calvin Pease Award

Embracing Web 2.0: Archives and the Newest Generation of Web Applications

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Abstract

Archivists are converting physical collections to digital formats and displaying surrogates of these primary sources on their websites. Simultaneously, the Web is moving toward a shared environment that embraces collective intelligence and participation, which is often called Web 2.0. This paper investigates the extent to which Web 2.0 features have been integrated into archival digitization projects. Although the use of Web 2.0 features has not yet been widely discussed in the professional archival literature, this exploratory study of college and university repository websites in the United States suggests that archival professionals *are* embracing Web 2.0 to promote their digital content and redefine relationships with their patrons.

Introduction

As the World Wide Web gained popularity in the 1990s, archival repositories began developing websites, many of which were populated with information

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about the nature of a repository's collections, conditions for use, finding aids, and administrative details such as location and hours of operation. Although the degree to which archives use the Web varies, many archives regardless of size have at least published a homepage announcing their existence.[1] Recently, archival professionals have undertaken projects to convert their physical collections to digital format and display the surrogates of these primary sources on their websites. They are doing so with the promise of making "information accessible that was previously only available to a select group of researchers" and thus allowing "users to search collections rapidly and comprehensively from anywhere at any time."[2]

Concurrently, the Web is moving toward a shared environment, presently labeled "Web 2.0," that embraces collective intelligence and participation, and affords previously passive recipients of content the opportunity to engage with, combine, share, and "mash up" information in new and imaginative ways. *Blog, wiki, podcasting, RSS* (Really Simple Syndication) *feed,* and *collaborative tagging* are all Web 2.0 terms that are becoming more familiar to both online users and mainstream society. Social networking websites such as YouTube, Flickr, and Facebook allow users to contribute—not just view—content. Of approximately 142 million Internet-using Americans, many actively participate online by blogging (12% of online adults), sharing personal files (22% of online adults), uploading photos to the Web (37% of all users), and creating a profile on a social network (20% of all online adults).[3] Although none of these numbers is likely to approach 100% any time soon, it is likely that the percentages will rise, and participation will become a more pervasive aspect of our online lives.[4] "Whatever language we use to describe it, the beating heart of the Internet has always been its ability to leverage our social connections," which enables direct access to the person, as well as "access to his or her own world." [5]

Archives and Web 2.0

Given the potential benefits of the World Wide Web to archival repositories, a natural question is: To what extent are Web 2.0 features integrated into

[1] Elizabeth Yakel and Jihyun Kim, "Midwest State Archives on the Web: A Content and Impact Analysis," *Archival Issues* 28, no. 1 (2003–2004): 47.

[2] Trevor Jones, "An Introduction to Digital Projects," May 2001, University Library at University of Illinois Urbana-Champaign, available at http://images.library.uiuc.edu/resources/introduction.htm, accessed 24 October 2007.

[3] Lee Rainie, "Web 2.0 and What It Means to Libraries," presentation, April 2007, Computers in Libraries 2007 Conference, available at http://www.pewinternet.org/PPF/r/94/presentation_display.asp, accessed 13 November 2007.

[4] Paul Miller, "Web 2.0: Building the New Library," *Ariadne,* October 2005, available at http://www.ariadne.ac.uk/issue45/miller/#14, accessed 13 November 2007.

[5] Mary Madden and Susannah Fox, "Riding the Waves of 'Web 2.0,' " report, 5 October 2006, available at http://www.pewinternet.org/ PPF/r/189/report_display.asp, accessed 13 November 2007.

archival digitization projects? The answer is not obvious. There was some initial discussion of the topic of Web 2.0 on the wiki associated with the 2007 Annual Meeting of the Society of American Archivists[6] under the heading "SAA 2008 Ideas" that emerged from an informal Web 2.0 session at that meeting.[7] Additionally, the wiki associated with the 2008 SAA annual meeting[8] includes blogging and tagging links encouraging participants to add blog posts and tag items, including photos and blogs with "SAA2008." While it is noteworthy that a contingent of meeting participants seem interested in how archives have adopted new technologies and are using a few of these Web 2.0 technologies on the wiki, it is important to stress that there is no mention of digital collections or that the discussion has moved beyond these original postings.

In addition to the wiki, a handful of archivist bloggers, including ArchivesNext,[9] archivematica,[10] and the Accidental Archivist,[11] are openly discussing Web 2.0's impact on archival repositories and its potential benefit. ArchivesNext is perhaps the most "Web 2.0-centric" and devotes a page of the blog to "Archives and 'new technology.' " The blog's author, Kate Theimer, writes that this is "a first attempt to collect examples of archives using 'new' technologies. I use the quotation marks because these really aren't new technologies, but I think some archives still consider them with some wariness."[12] While it is significant that Web 2.0 is generating some discussion on blogs, it is difficult to infer the number or type of individuals reading and actively participating in these discussions.

The professional literature suggests that some members of the archival community recognize the importance of embracing new technology to remain vital to users in the digital era, but little evidence exists as to what archival repositories are *doing* to fulfill this critical mission. In contrast, the library community appears to be more engaged in the discussion of Web 2.0 and its possibilities as evidenced by the popularity of the topic in the professional literature. This dichotomy in the professional literature raises further questions about the archival community's commitment to this latest generation of Web applications.

The purpose of this exploratory study is twofold. The first phase is a content analysis of archival repository websites that explores the extent to which archival repositories use the Web's next generation of applications to support

[6] The wiki "**is not** provided, hosted or officially endorsed by SAA as an organization."

[7] See http://ibiblio.org/saa2007/index.php/SAA_2008_Ideas, accessed 8 November 2008.

[8] See http://www.ibiblio.org/saawiki/2008/index.php/Main_Page, accessed 8 November 2008.

[9] See http://www.archivesnext.com/, accessed 20 November 2007.

[10] See http://archivemati.ca/, accessed 20 November 2007.

[11] See http://accidentalarchivist.blogspot.com/, accessed 20 November 2007.

[12] ArchivesNext, 2007.

access, use, and interactions associated with their digital collections. Based on these findings, the second phase entails selecting a subset of the archival repositories that have implemented Web 2.0 applications and conducting one-on-one interviews with staff primarily responsible for the implementation. These interviews address reasons for implementation, challenges associated with implementation, and the success or failure of implementation, providing evidence of what archival repositories are doing to remain vital to users in the digital era.

As many applications fall under the umbrella of Web 2.0, it is necessary to narrow the list to a manageable size. The four "social media tools" recommended by Darlene Fichter[13] and a bookmarking definition provided by Elizabeth Yakel and Jihyun Kim[14] suggest the following list of tools for fostering user engagement:

- Blogs (short for *weblog*) enable person-to-person communication on a variety of topics. Most are written by individuals who share information, ideas, experiences, and recommendations and "make it easy for the reader to move from reading web pages to creating their own web content."[15] Comments on blogs are another form of interactive, user-generated content.
- Community sites include wikis and social networking sites. These forums focus on a particular topic or niche and allow for a high level of participation and a rich user experience, and they "illustrate the dynamic shift away from the static web and leap toward the next generation of user-created content."[16]
- Ratings and reviews are website features that invite user participation and contribution. These sites, such as Digg or Flickr, encourage participation by enabling sharing, creating favorites, collecting, tagging, and organizing.
- Podcasting allows individuals to download, upload, share, record, and edit audio clips and/or radio-type shows. The ability to record and distribute audio content via the Internet "affords everyone the chance to be the producer and host of their own 'radio show.' "[17]
- Bookmarking enables sharing and reuse of links to sites or pages, facilitating "shared discovery and new ways of understanding the content."[18]

[13] Darlene Fichter, "How Social Is Your Web Site? Top Five Tips for Social Media Optimization," *Online* 31, no. 3 (May/June 2007): 57–60.

[14] Yakel and Kim, "Midwest State Archives."

[15] Nancy Courtney, *Library 2.0 and Beyond: Innovative Technologies and Tomorrow's User* (Westport, Conn.: Libraries Unlimited, 2007), 6.

[16] Courtney, *Library 2.0 and Beyond,* 80.

[17] Courtney, *Library 2.0 and Beyond,* 35.

[18] Courtney, *Library 2.0 and Beyond,* 8.

Literature Review

The literature produced by the archival community in the last several years tends to focus on the general adoption of technology by archivists so that they remain essential to current and future users in the digital era.[19] In contrast to the general call to technology, Richard Pearce-Moses *indirectly* refers to the latest generation of the Web. He states that "wikis, Amazon, and Google show us how people can work asynchronously and collectively to build useful resources and we'll see more and more on-line collaboration tools" and in particular "we'll see changes in public expectations for access to information."[20] While one of the few archivists to acknowledge the possible impact of this recent technology on the archival profession in the published literature, like previous authors, he neither provides examples of repositories experimenting with Web 2.0 applications nor presents any solutions for how to capture this technology to meet users' changing expectations. In the end, he concludes that archivists need to be excited, rather than intimidated, by new technology and innovations.

In 2002, Margaret Hedstrom examined how current and future generations of users may approach archives through this type of computer interface. Hedstrom imagines a "generation of users, with fundamentally different perspectives on the past, who will approach archives through computer interfaces, rather than visiting physical archives and interacting with tangible documents."[21] She argues that as human-mediated archives yield to computer-mediated archives, it is critical that archivists re-examine their role between the user and the materials. She confidently asserts that archivists can use technology to "declare and share power" with each other and with current users and future generations. Many of her recommendations for accomplishing this shared power focus on archivists shaping interfaces and providing innovative tools that allow the virtual user the opportunity to "navigate, explore and make their own interpretation of archives."[22] Hedstrom asks provocative questions for archivists to confront before proceeding with interface design, including, "Should our interfaces reinforce archivists' perspectives on what constitutes an archives or should we enable users to construct their own notions of archives based on the needs or values that matter most to them?" and "How much power

[19] See, for example, H. Thomas Hickerson, "Ten Challenges for the Archival Profession," *American Archivist* 64 (Spring/Summer 2001): 6–16; John A. Fleckner, "The Last Revolution and the Next," *Journal of Archival Organization* 2, nos. 1–2 (2004): 9–16; and Randall C. Jimerson, "Redefining Archival Identity: Meeting User Needs in the Information Society," *American Archivist* 52 (Summer 1989): 332–40.

[20] Richard Pearce-Moses, "Janus in Cyberspace: Archives on the Threshold of the Digital Era," *American Archivist* 70 (Spring/Summer 2007): 1.

[21] Margaret Hedstrom, "Archives, Memory, and Interfaces with the Past," *Archival Science* 2 (2002): 24.

[22] Hedstrom, "Archives, Memory," 33.

do we, as archivists, wish to share?"[23] These questions provide a glimpse into what an archival repository *could* become in the future.

The potential effects of Web 2.0 have not gone unnoticed in the library community, which has produced a greater body of literature about the topic than has the archival community.[24] This is not to suggest that the library community has completely deciphered what Web 2.0 is or how its potential can be harnessed, nor does it mean that the entire library community has embraced the concept of Web 2.0. It is significant that librarians and academic researchers are beginning to recognize the potential—and possibly inevitable—impact of Web 2.0 on libraries and, therefore, are more widely discussing it in professional journals and online forums than are archivists.

At the center of the library literature about Web 2.0 is the call for librarians to

1) recognize that the Web is no longer a conglomeration of static websites and search engines but is now a shared network space that "drives work, research, education, entertainment and social activities—essentially everything that people can do";[25]
2) evaluate the potential value of Web 2.0 technology for their respective libraries as a means to bring their services to users; and
3) be proactive and experimental with this type of technology to improve the range of services available and meet the needs of users.

Many authors argue that libraries are in the habit of providing the same services and programs to the same groups and, as a result, grow complacent and fail to change. Many call for librarians to "explore popular new types of internet services such as Facebook instead of quickly dismissing them as irrelevant to librarianship" and "learn new ways to reach out and communicate better" with a larger segment of users.[26] Only a few report on implementation and experimentation with Web 2.0 applications.[27]

Library and archival literatures differ most significantly in the effort of the academic library community to research the potential benefits, shortcomings, and challenges associated with using and implementing these recent social

[23] Hedstrom, "Archives, Memory," 42.

[24] See, for example, Michael E. Casey and Laura C. Savastinuk, "Library 2.0; Service for the Next-Generation Library," *Library Journal* (1 September 2006), available at http://www.libraryjournal.com/article/CA6365200.html, accessed 27 October 2007; Amy Benson and Robert Favini, "Evolving Web, Evolving Librarian," *Library Hi Tech News*, no. 7 (2006): 18–21; Tom Storey, "Web 2.0: Where Will the Next Generation Web Take Libraries?," *OCLC Nextspace* (2006), available at http://www.oclc.org/nextspace/002/1.htm, accessed 27 October 2007; and Andrew Harris and Susan Lessick, "Libraries Get Personal: Facebook Applications, Google Gadgets, and MySpace Profiles," *Library Hi Tech News* 8 (2007): 30–32.

[25] Storey, "Web 2.0."

[26] Casey and Savastinuk, "Library 2.0"

[27] Such as the Darien Library, http://www.darienlibrary.org/ and MyLibrary at North Carolina State University, http://www.lib.ncsu.edu/mylibrary/, both accessed 24 October 2007.

networking applications. Krystyna Matusiak explores the challenges and usefulness of social tagging and its potential implications for developing user-oriented indexing of digital collections. Her study compares the level of indexing of two photograph collections. One collection is displayed on a more traditional University of Wisconsin-Milwaukee website using the CONTENTdm digital media management system, Dublin Core metadata schema, and a number of controlled vocabulary tools. The other is displayed on Flickr, which relies heavily on the user providing details about the collection. She concludes that the traditional approach provides more consistency and detail of images in a structured, hierarchical manner. She concedes, however, that the social classification system in Flickr gives users the freedom to "describe the world in which they see it."[28] Matusiak admits that her comparison is "brief," but it offers some insight into the potential benefits of social tagging as it considers an opportunity for greater user engagement with the library's digital collections.

Laurie Charnigo and Paula Barnett-Ellis[29] surveyed librarians throughout the United States to find out what impact, if any, the social networking site Facebook, has had on academic libraries. They sought information that included librarians' perspectives on Facebook, how they perceived their roles associated with it, and their awareness of Internet social trends and their place in the library. With a response rate of 51%, the authors found that only a handful were positive and excited about the possibilities of online social networking. Interestingly, 51% of the respondents indicated that "librarians needed to keep up with Internet trends, such as Facebook, even when such trends are not academic in nature,"[30] and 34% of the respondents who had heard of Facebook had created a personal profile.[31] The authors acknowledge limitations to their study but conclude that "What role the library serves in these environments might largely depend on whether librarians are proactive and experimental with this type of technology or whether they simply dismiss it as pure reaction."[32]

A few papers in the archival literature explore the implications of Web 2.0. Elizabeth Yakel[33] addresses Web 2.0 and its impact on archives. She contends that despite early interest in the Web, archives have become less experimental and slow to adopt some of the features of the more recent social networking applications.

[28] Krystyna Matusiak, "Towards User-centered Indexing in Digital Image Collections," *OCLC Systems and Services: International Digital Library Perspectives* 22, no. 4 (2006): 294.

[29] Laurie Charnigo and Paula Barnett-Ellis, "Checking Out Facebook.com: The Impact of a Digital Trend on Academic Libraries," *Information Technology and Libraries* 26, no. 1 (2007): 23–34.

[30] Charnigo and Barnett-Ellis, "Checking Out Facebook.com," 29.

[31] Charnigo and Barnett-Ellis, "Checking Out Facebook.com," 27.

[32] Charnigo and Barnett-Ellis, "Checking Out Facebook.com," 31.

[33] Elizabeth Yakel, "Inviting the User into the Virtual Archives," *OCLC Systems and Services; International Digital Library Perspectives* 22, no. 3 (2007): 159–63.

Although she does not supply empirical data for the reasons behind this perceived procrastination, she offers a few possibilities, including wariness to move away from the traditional relationship between archivist and researcher, and the archivist's desire to maintain authoritative metadata about the digital collections. Drawing on some of the conclusions from Hedstrom, Yakel recognizes that "reconceptualizing the role of the archivist and the researcher is hard," however, "by and large the sites [Web 2.0 adopters] reviewed in this article have ceded some control over those core archival functions to their visitors and are reimagining the ways in which researchers can interact with the archival record and with fellow travelers in the virtual archives."[34]

Using a combination of Web analytics, surveys, interviews, and content analysis, Magia Ghetu Krause and Elizabeth Yakel[35] provide an initial evaluation of an experimental online finding aid that was created and implemented as an integral piece of the Polar Bear Expedition Digital Collection. Deployed in 2006, the next generation finding aid offers bookmarking, user-generated comments, and user profiles, with the intent of enhancing social interaction as well as facilitating the accessibility of archival materials.

While their initial findings suggest that using Web 2.0 features may increase the accessibility of archival materials and enrich traditional finding aids, Krause and Yakel concede that they were disappointed in the limited use visitors made of some of the interactive features. They also question whether these social navigation tools are the most appropriate for finding aids or whether other tools such as annotation, tagging, or explicit ranking may be more appropriate.[36] Krause and Yakel are the first to study the use of social navigation tools in an online archival environment, thus revealing something about end users and their relationship with digital collections. This in itself is significant. Perhaps most importantly they remain optimistic about the future and the use of Web technologies in enhancing the accessibility of and interaction with archival materials. Indeed, they assert they "will continue to push the boundaries of current descriptive representations and reconceptualize how the interactions among archivists, researchers, and records can enhance the archival record."[37]

Max Evans introduces the concept of "commons-based peer-production" as a means for archival institutions to improve management of their burgeoning collections. Evans argues that archivists are at a crossroads; the Information Age "means many more records to inventory, appraise, accession, and process. But it suggests to the rest of the world that all information will be easily and quickly

[34] Yakel, "Inviting the User," 163.

[35] Magia Ghetu Krause and Elizabeth Yakel, "Interaction in Virtual Archives: The Polar Bear Expedition Digital Collections Next Generation Finding Aid," *American Archivist* 70 (Fall/Winter 2007): 282–314.

[36] Krause and Yakel, "Interaction in Virtual Archives," 312.

[37] Krause and Yakel, "Interaction in Virtual Archives," 312.

available. The Internet promises to increase the public's awareness and use of archives and historical records—a future I think we all want to encourage. But reality intrudes."[38] Citing limited resources, budget cuts, and changing formats, Evans asserts that this "conundrum" must be solved to make archival records more effectively searchable and retrievable.

Evans's model suggests changing archival activities to balance the realities of the information age with the realities of managing growing collections, and at the heart of this article is his "commons" concept in which users determine the level of intellectual access to archival materials. He encourages user participation and acknowledges the development of collaborative Web 2.0 tools, suggesting that it is the archivist's job to "make sure that this tagging supports archival access systems."[39] By creating a common environment shared mutually by archivists and archival users, he maintains that holdings will be much easier to discover, access, and use, but, perhaps more importantly, the "commons" will build a "community of highly intelligent men and women who will come to understand and appreciate archives."[40]

Are archival repositories at odds with the dynamic information needs and expectations of end users in a "Web 2.0" world, or are they perhaps just slow to adopt these social networking applications as Elizabeth Yakel suggests?[41] Are archivists striving to remain integral actors in the information society by providing information to users in formats they expect with the access they demand or are they ignoring the potential information needs of their users? This exploratory study hopes to provide some preliminary answers to both questions.

Methodology

The methodology for this study combined content analysis with one-on-one interviews.

Content Analysis

The goal of the content analysis was to examine the extent to which archival repository websites are implementing Web 2.0 applications with respect to their digital collections. For the purposes of this study, *archival website* was broadly defined as the website of a repository responsible for the long-term preservation

[38] Max J. Evans, "Archives of the People, by the People, for the People," *American Archivist* 70 (Fall/Winter 2007): 388.

[39] Evans, "Archives of the People," 398.

[40] Evans, "Archives of the People," 400.

[41] Yakel, "Inviting the User."

of materials, and *digital collection* was defined as digital resources organized into collections spanning a range of subjects that support the research needs of its community. For further clarification, a digital exhibition, which characteristically displays only a selected few digital resources with extensive description, was not considered a digital collection. A website "hosting" a digital collection was broadly defined as one contributing digital content to its own website thus making its content accessible via the World Wide Web. Consortia of digital collections were excluded from this study as it would be difficult to decide if a shared collection counted as one digital collection or multiple collections.

The content analysis was completed by first determining if a repository website was hosting a digital collection. I initially examined the homepage of each website to determine if a digital collection was listed as either a feature or a resource. In many instances, the digital collection was easily identifiable (Figures 1 and 2) and thus was included on a recording sheet. If a link to a digital collection was not posted on the homepage, subsequent Web pages were inspected, and, as a final step, a search was done on the site map. If a digital collection did not exist (see Figure 3), this was also noted on the recording sheet.

After confirming the existence of a digital collection, I counted the number of social media tools used on the archival website and documented on the recording sheet. Figures 4 through 8 illustrate the use of these applications by archival websites. If a social media tool did not exist, this was also recorded.

Content analysis sampling

The Repositories of Primary Sources served as the principal sampling frame for this study. The website is "a listing of over 5,000 websites describing holdings of manuscripts, archives, rare books, historical photographs, and other primary sources for the research scholar."[42] One of the most complete lists of archival repositories available, it includes a variety of sizes and types of repositories, a broad cross-section of archival repositories representing the larger archival community. In addition to the sampling frame, archival repository websites known to have implemented Web 2.0 applications (see Appendix 1) were a secondary source for inclusion in the content analysis. These included repositories located on professional listservs, on other websites (i.e., an archivist's blog), by "word of mouth," and during the content analysis.

Since the 5,000 repositories include primary sources unrelated to archives, it was first necessary to create criteria for inclusion/exclusion in the sample to ensure that it represented archival repositories. The criteria were as follows:

[42] Terry Abraham, *Repositories of Primary Sources*, available at http://www.uiweb.uidaho.edu/special-collections/Other.Repositories.html, accessed 15 October 2007.

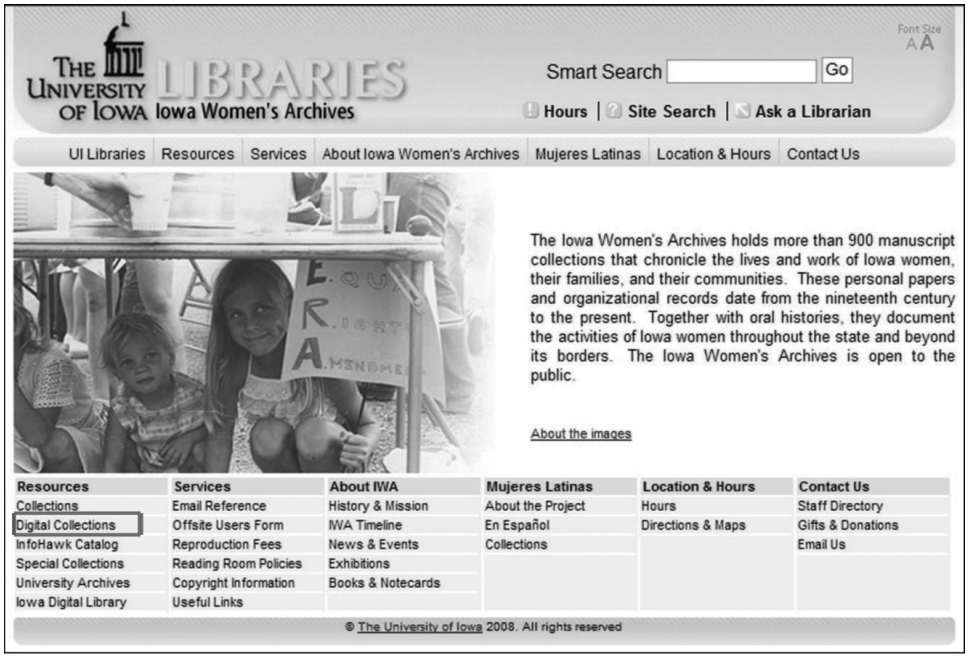

FIGURE 1. Example of repository website with digital collections. The homepage of the Iowa Women's Archives clearly shows the presence of digital collections (see the outlined "Digital Collections" under Resources). Selecting the link brings the user to the digital collections Web page thus confirming its content (http://www.lib.uiowa.edu/iwa, accessed 30 March 2008).

- The repository is located in the United States;
- The words "archives" or "special collections" appear in the name of the repository; and
- The repository is affiliated with either a university or a college (a majority of universities/colleges have special collections or archives).

After the list was narrowed to approximately 1,000 archival websites, the population was stratified before executing the sampling. As the Repositories of Primary Sources list was already divided first by region (Eastern [A–M], Eastern [N–W], and Western) and then by state, this seemed to be the most appropriate stratification. The last step of the sampling was using the probability technique of systematic sampling. The list of approximately 1,000 archival websites was first compiled into an Excel spreadsheet in the order of the stratification, then, to ensure that the sample was random, I started at the fourth repository listed in the spreadsheet and selected every fifth unit for inclusion in the sample. This sample, together with the repositories known to have implemented Web 2.0 applications, totaled 213 repositories selected for content analysis.

FIGURE 2. The digital collections of the Iowa Women's Archives (http://digital.lib.uiowa.edu/iwa, accessed 30 March 2008).

One-on-one interviews

The second phase of the study entailed conducting structured interviews with the individuals responsible for the implementation of the Web 2.0 application(s). The purpose of the interviews was to investigate the topic of Web 2.0 applications with the expectation that the data would reveal what measures archival repositories are taking to remain vital to users in the digital era. The interviews were structured, meaning the interviewer worked through a predetermined list of primarily open-ended questions in a set order (see Appendix 2).

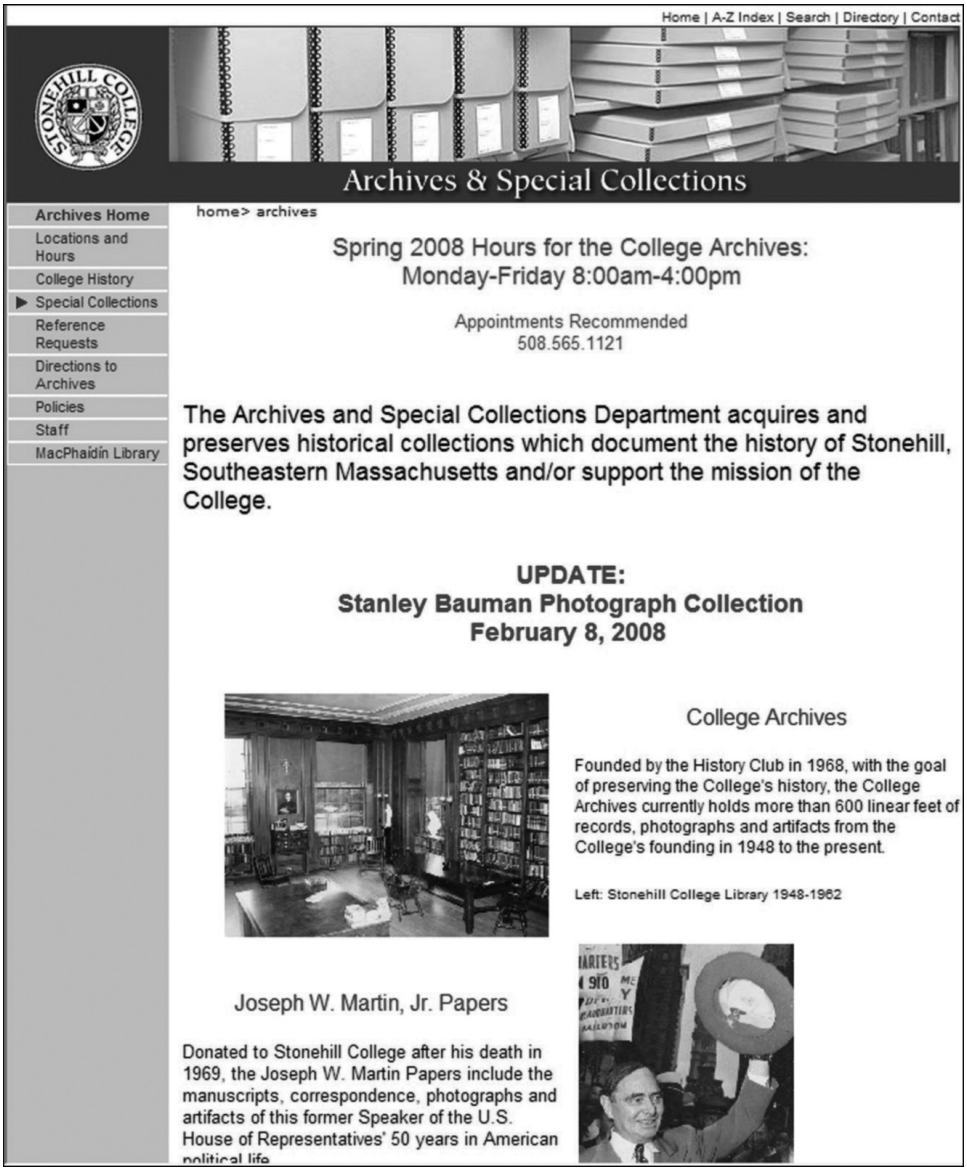

FIGURE 3. Example of repository website with no digital collections. After examining several Web pages and conducting a site search, I concluded that the repository website of the Stonehill College Archives and Special Collections did not host a digital collection (www.stonehill.edu/archives/index.htm, accessed 30 March 2008).

The interviews were recorded on a cassette tape and the interviewer took detailed notes to ensure that all answers were sufficiently captured.

The individuals to be interviewed were identified using multistage cluster sampling. From the list of the 38 repository websites in which a Web 2.0 application was

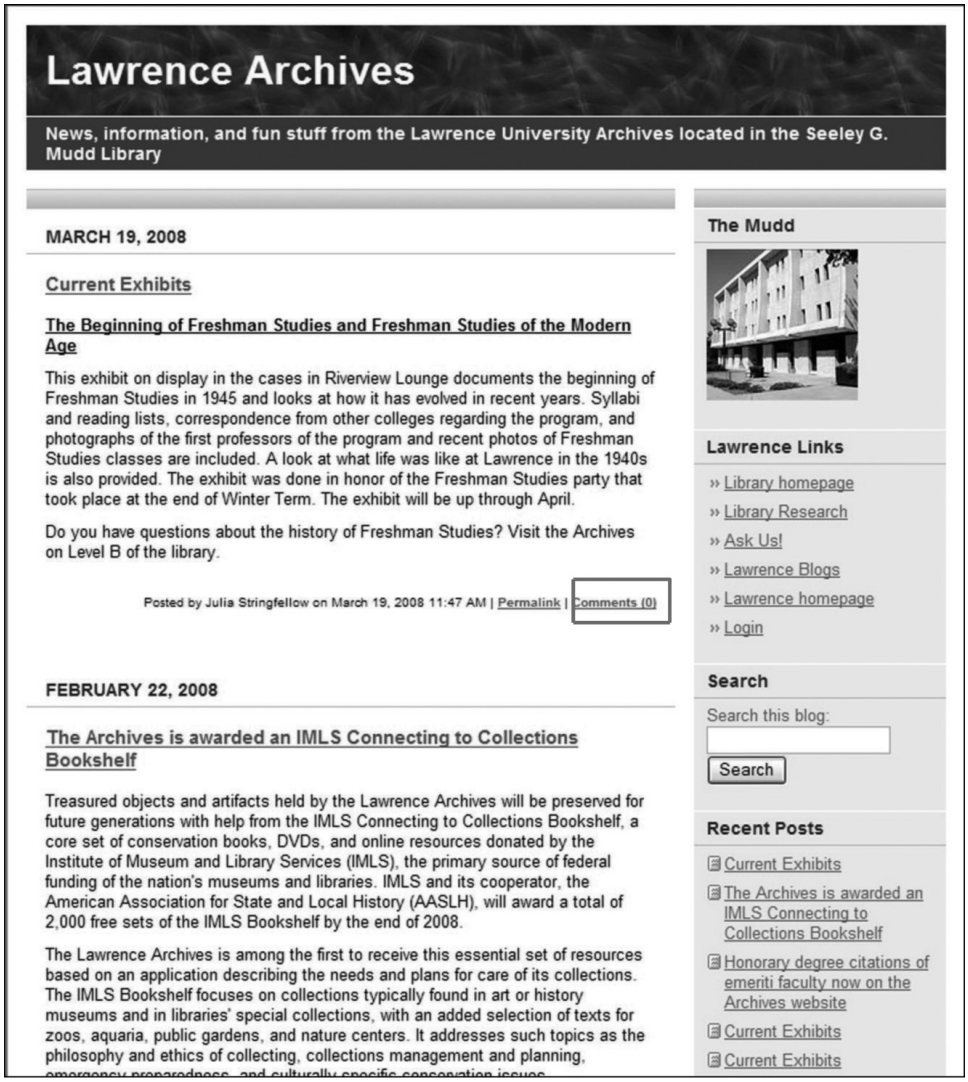

FIGURE 4. Example of repository website employing a blog. The blog of the Lawrence University Archives allows users to make comments and enables person-to-person communication (http://blogs.lawrence.edu/library/archives/, accessed 30 March 2008).

recognized as being used, I selected every second repository thus compiling the final list of 20 repositories.

Of the 20 websites reviewed, 14 listed staff members and included key information such as title, telephone number, and email address. Based on title, such as archivist, head of special collections, director, and special collections librarian, I targeted the individual most likely responsible for the implementation of the Web 2.0 application. The remaining 6 websites simply listed a general

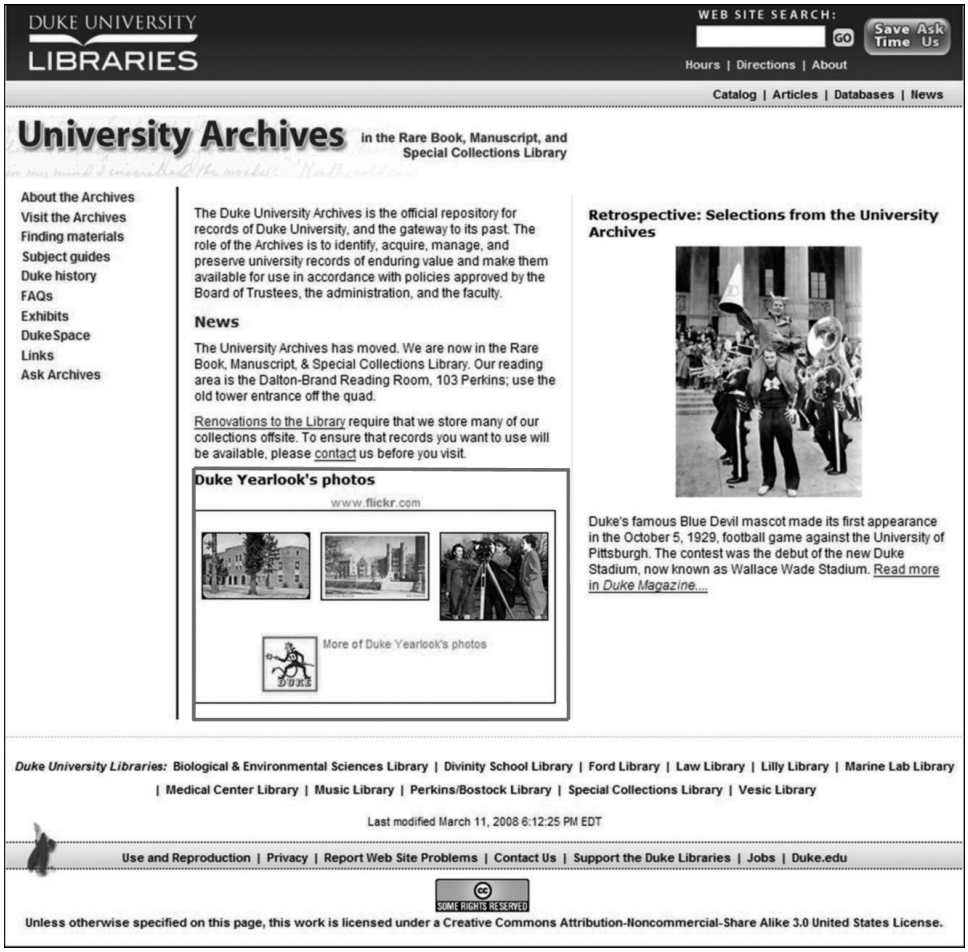

FIGURE 5. Example of repository website employing a community site. The Duke University Archives (http://library.duke.edu/archives, accessed 30 March 2008) promotes both its digital and physical collections through the community photo-sharing website Flickr (http://www.flickr.com/DukeYearlook, accessed 30 March 2008).

reference email or telephone number. An email invitation was sent as the first point of contact with a potential respondent requesting a response by 14 March 2008. Approximately a week later, I contacted by telephone the individuals who had not responded to the initial email, and if there was no answer, I left a voicemail. The interviews were closed to response by 21 March 2008.

The 8 interviews were each approximately forty-five minutes to an hour in length, depending on the availability of the participant. Overall, the shortest interview was approximately fifteen minutes while the longest lasted sixty minutes. All interviews were conducted by telephone with the exception of one conducted in person.

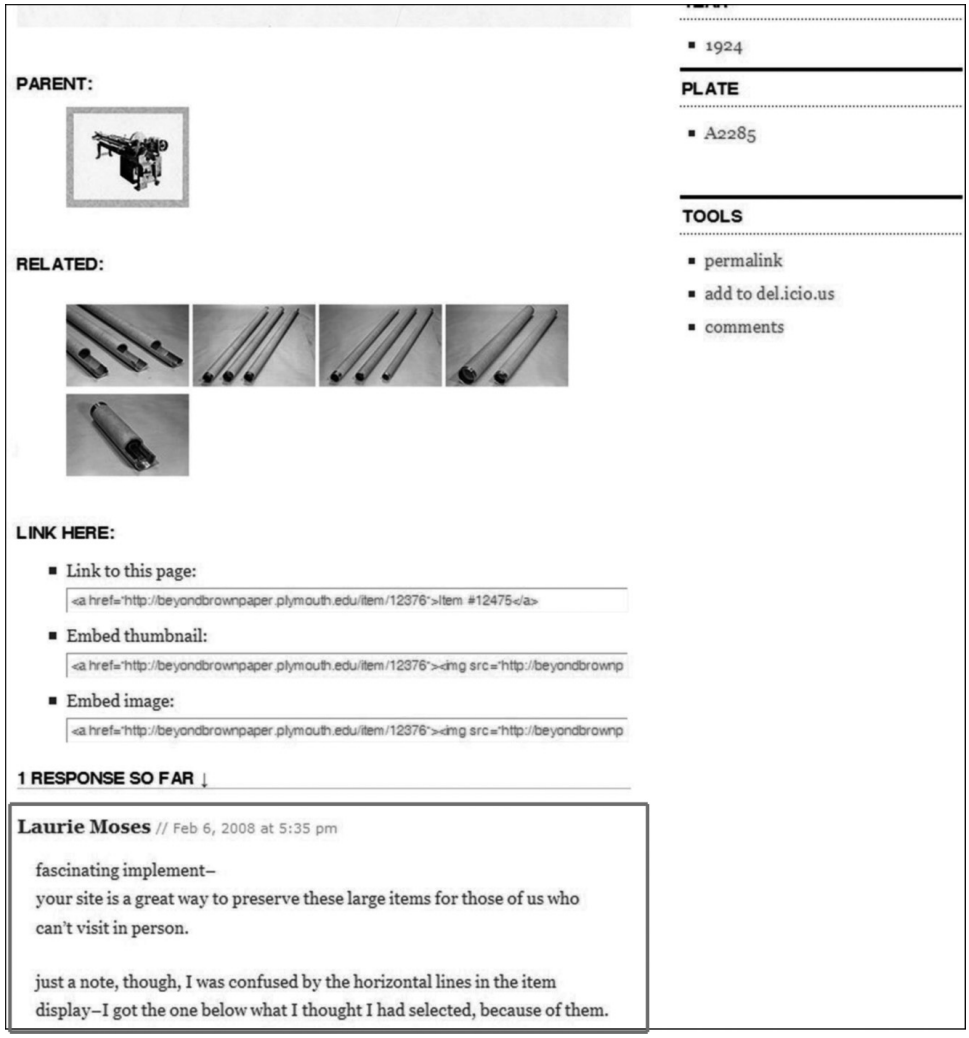

FIGURE 6. Example of repository website employing ratings and reviews. *Beyond Brown Paper* at Plymouth State University invites user participation and contribution by allowing users to input written content related to the photographs or to communicate by phone via a toll-free number (http://beyondbrownpaper.plymouth.edu/about/, accessed 30 March 2008).

Findings

Content Analysis

I evaluated 213 archival repositories to determine the extent to which they are using the Web's next generation of applications with respect to their digital collections. The first step was to ascertain if a website was hosting a digital collection. Of the 213 repositories evaluated, 85 (40%) host a digital collection, with an additional 6 repositories in the process of developing or "hoping to" develop digital collections

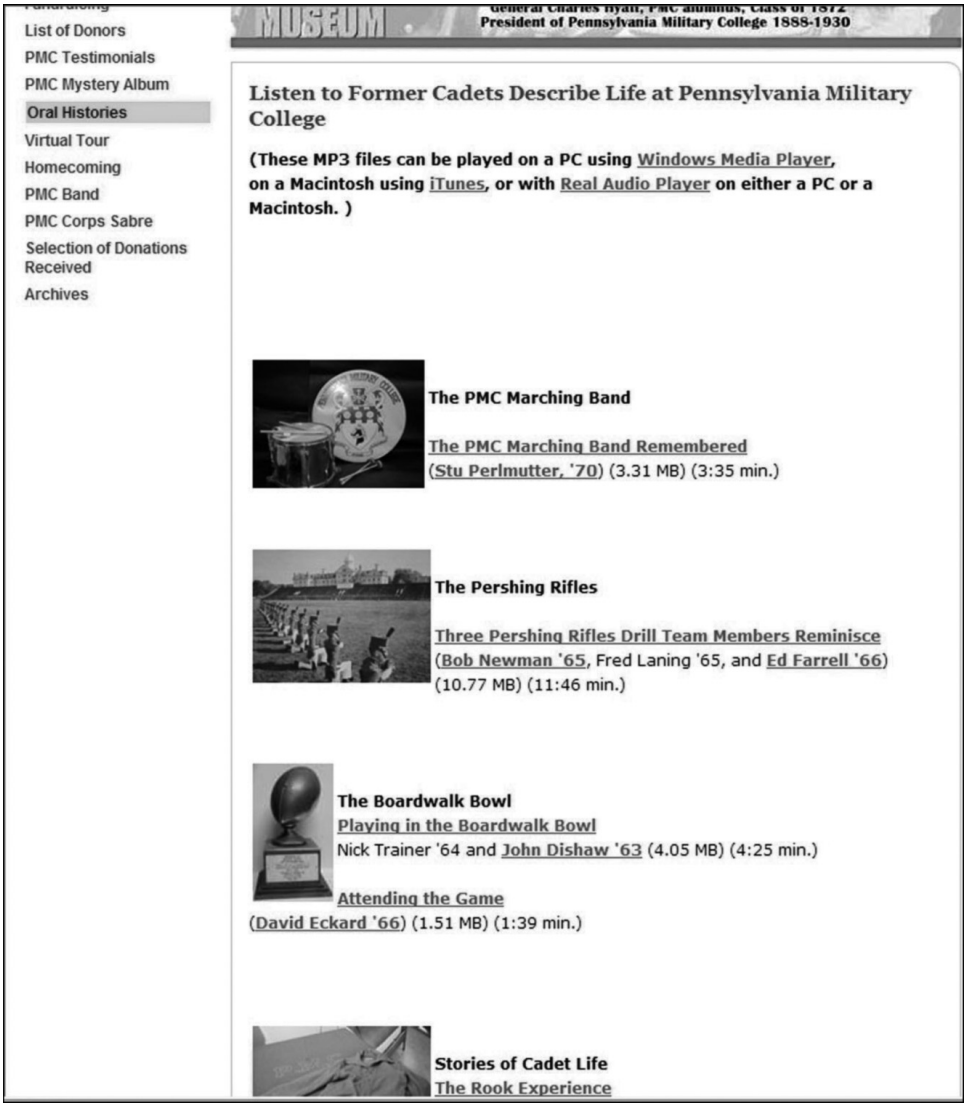

FIGURE 7. Example of repository website employing podcasting. The Widener University Archives allows individuals to download audio clips (http://liberty.widener.edu/Student_Affairs/Arts_Media/Art_Gallery_and_Collection_/PMC_Museum/Oral_Histories/1150/, accessed 30 March 2008).

in the future. Of the 85 archival repositories websites with digital collections, a surprising 38 (45%) repositories employ a Web 2.0 application. Of these 38 repositories, 28 (74%) use at least one Web 2.0 application, 8 (21%) employ two Web 2.0 applications, and 2 repositories (5%) employ three Web 2.0 applications. Figure 9 shows the type of Web 2.0 application most frequently used by archival repositories.

This dissection of the Web 2.0 applications suggests that the type of Web 2.0 application employed relates to the type of content management system a

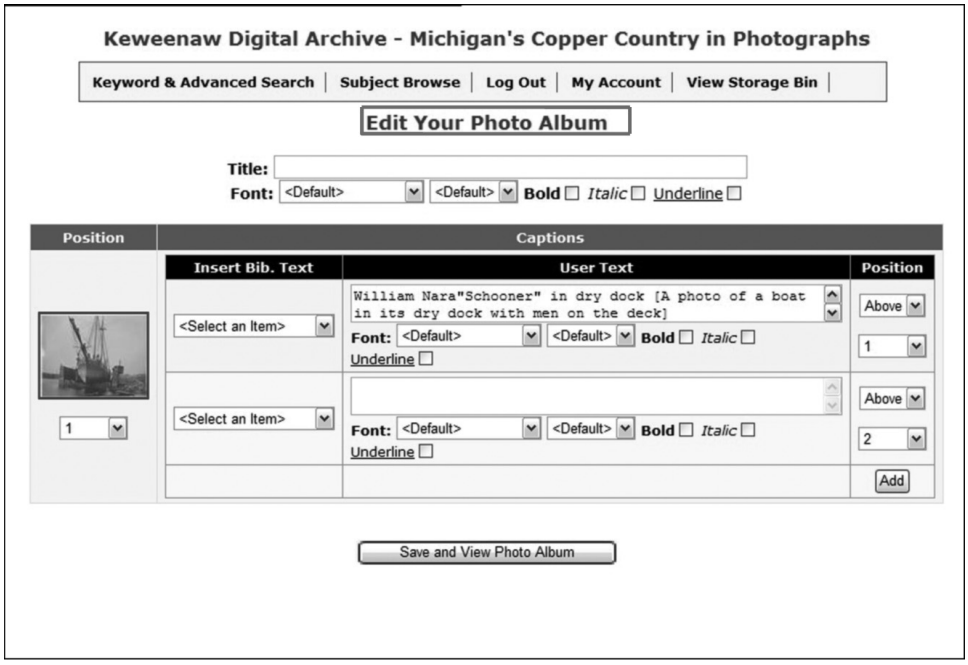

FIGURE 8. Example of repository website employing bookmarking. The Keweenaw Digital Archives encourages visitors to add their own comments and information to photographs in the archives and to create their own personal "web album" of images on particular subjects or places (http://digarch.lib.mtu.edu/default.aspx, accessed 30 March 2008).

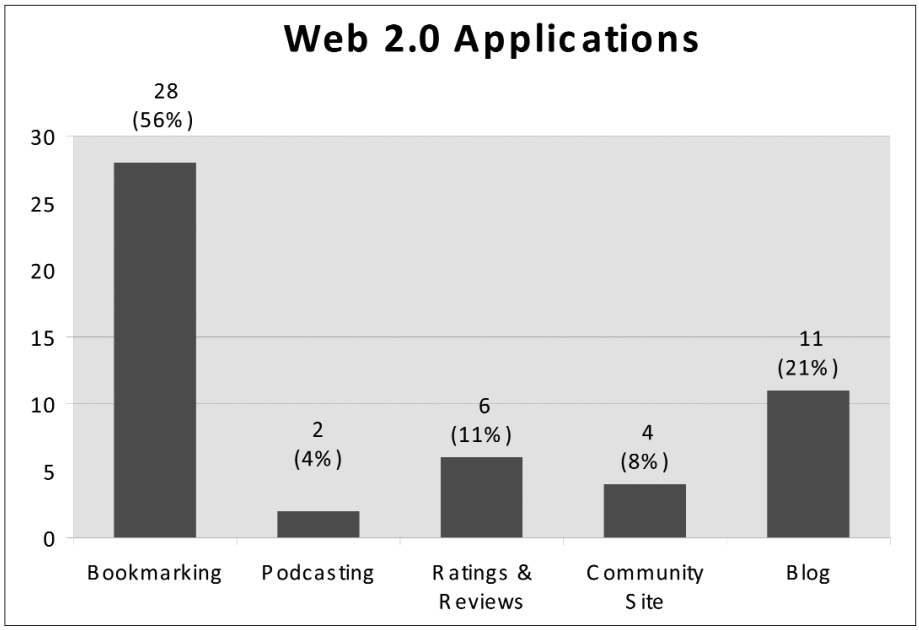

FIGURE 9. Number and corresponding percentage of Web 2.0 applications most frequently used (n=50).

repository uses to manage and display its digital collection. For example, of the 28 repositories offering a bookmarking feature, 21 (75%) use CONTENTdm, a commercial digital management collection package that allows users to add images to their "favorites," reference the Uniform Resource Locators (URLs), and interact with images by zooming in and out on different parts of them. Two additional repositories use other commercial systems with features similar to CONTENTdm. The remaining 5 repositories with a bookmarking feature use homegrown systems[43] to manage and host their digital collections. The distinction between the commercial and homegrown content management systems (CMS) is noteworthy because the bookmarking features for the homegrown systems go well beyond those offered by the commercial system. Several examples highlight this divergence. The Keweenaw Digital Archive at Michigan Technological University features a "User Photo Album" component allowing users to build their own exhibit. Users can select images, add their own comments or narrative, insert bibliographic text, arrange the positions of the images, and combine the selected images into a Web-based photographic exhibit available to the public.[44] The bookmarking feature used by the University Archives at the University of Minnesota not only allows users the ability to add an image to their "basket" (thus building their own mini-collection), but also gives them the opportunity to add and post notes about the image and export (save/open) the image to their own computer.[45] The bookmarking feature used by Frank and Marshall College Archives and Special Collections also includes a blog covering the latest exhibitions and Web features sponsored by the repository, along with a profile in Facebook.[46]

The data also reveal that the commercial management system/homegrown dichotomy occurs in the other Web 2.0 applications used by repositories. I examined the use of Web 2.0 applications employed outside the standard features of the commercial CMS, including blogs, community sites, ratings and reviews, and podcasting. The data suggest that repositories using a homegrown rather than a commercial content management system use these types of Web 2.0 applications more frequently. Figure 10 illustrates this comparison. Although this dichotomy was not specifically addressed in the interview process, the data suggest that those repositories implementing an in-house content management system are more likely to experiment with Web 2.0 applications than those using a commercial system. Of the 11 repositories with a blog on their website, 6 (55%) use a homegrown system for their digital collections, compared to the 5 using CONTENTdm. The trend is more dramatic with the remaining Web 2.0

[43] In general, the homegrown content management systems lack the distinct branding of a commercial system. In some cases, the repository website indicates that the system is unique to the institution.

[44] See http://digarch.lib.mtu.edu/default.aspx, accessed 30 March 2008.

[45] See http://special.lib.umn.edu/uarch/, accessed 30 March 2008.

[46] See http://library.fandm.edu/archives/new_archives.html, accessed 30 March 2008.

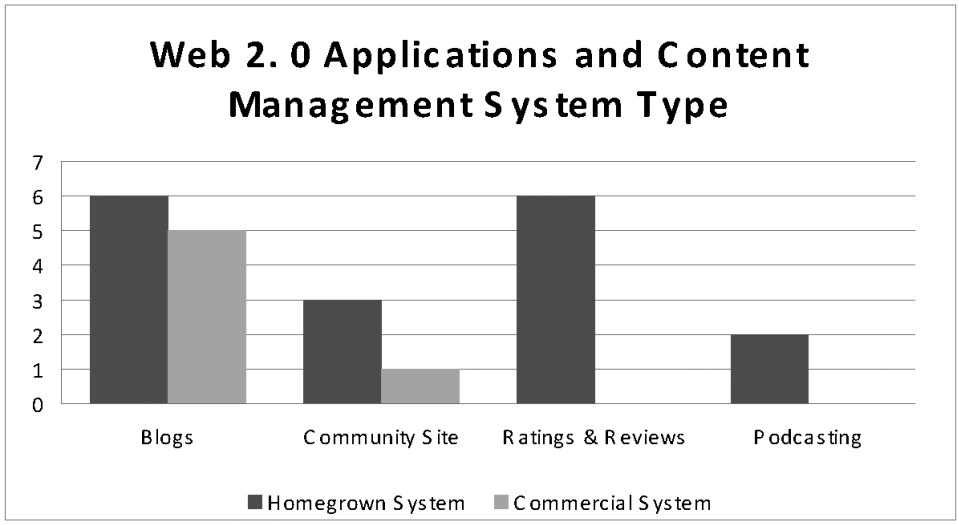

FIGURE 10. Web 2.0 applications and management system type (n=22).

applications. Three repositories (75%) employing a community site use a homegrown system; only 1 uses a commercial system. For the 8 repositories with both ratings and reviews (6) and podcasting (2), all (100%) use a homegrown content management system. For example, the University Archives in the Rare Book, Manuscript, and Special Collections Library at Duke University, promotes both its digital and physical collections through the photo-sharing website Flickr.[47] More than 600 digital images, including photographs, postcards, and catalogs, are displayed in individual sets covering subjects such as student life and the Duke Blue Devil mascot.

Last, the data suggest that those repositories with an in-house content management system are more novel with their use of the Web 2.0 applications than are their counterparts using the commercial system. Two examples illustrate this observation. The Naropa University Archives digitized 2,000 hours of audio recordings from activities at the Kerouac School and provides access to more than 500 hours of the collection online.[48] Most interesting is its system for ratings and review. The users of the collection can write a review of individual audio recordings and can incorporate a rating of zero to five stars. These ratings are included in "Recently Reviewed Items" and in the "Most Downloaded Items Last Week." The Plymouth State University Beyond Brown Paper project allows for comments on the photographic images and displays the comments with the image.[49] Moreover,

[47] See http://www.flickr.com/DukeYearlook, accessed 30 March 2008.

[48] See http://www.naropa.edu/archive/index.cfm, accessed 30 March 2008.

[49] See http://beyondbrownpaper.plymouth.edu/about, accessed 30 March 2008.

the repository provides an RSS feed and del.icio.us[50] option, allowing users to bookmark the page and receive updates.

Interviews

Of the 20 individuals initially requested by email to participate in the research study, 8 individuals (40%) responded and 6 agreed to be interviewed. Two indicated they were "fairly sure" their repository was not using a Web 2.0 application and declined participation. After contacting the remaining 12 potential participants by telephone, 2 more individuals agreed to be interviewed, 2 others were not available until after the 21 March 2008 closure date, and 8 did not respond. Overall, 12 out of 20 participants responded to the request for a 60% response rate, and 8 of the 20 individuals (40%), agreed to participate in the one-on-one interviews. After the interviews were conducted, it was determined that one of the interviews was invalid due to a misinterpretation of which unit "owned" the Web 2.0 application and its interview data were not included in the analysis.[51]

On the whole, the interview participants were overwhelmingly positive about using a Web 2.0 application on their repository websites. The participants' responses to the interview questions concerning their reasons for implementation, challenges associated with implementation, and the success or failure of these implementations are summarized and presented below.[52]

Impetus for including application on repository website

Motivation for implementation varies among respondents as shown in Table 1, but promoting and sharing content with current and future users are the most common reasons. Nearly half of the respondents employ these applications as a promotional tool for their collections in an effort to put their materials "out there" on the World Wide Web and let current and new users know their availability. Collectively, 5 out of the 7 respondents (71%) indicated that the driving force behind the application is the patron or user. Whether the incentive is sharing content with current patrons because they request it, eliciting help from patrons in describing collections, or wanting to use some of the emerging Web tools that their current patrons use, the data suggest that respondents are thinking about

[50] del.icio.us is a social bookmarking website used primarily for storing bookmarks online. This allows users to access the same bookmarks from any computer and add bookmarks from anywhere.

[51] The Web 2.0 application in question was a blog. The blog was prominently featured on the homepage of the archival repository website, but was not directly administered by the repository. In essence, the repository was providing a link to another unit responsible for the blog's content. I contacted the other unit, but did not receive a response.

[52] Note that participants typically provided multiple answers to the questions, therefore, the percentages of total respondents for each question do not add up to 100%.

Table 1. Impetus for Application

Reasons	Number of Respondents	Percentage of Total Respondents
Promotion of collections	4	57%
Trying out new technology	3	43%
Participation from patrons	2	29%
Sharing our content with potential new users	2	29%
Direction from leadership	1	14%
Staying current with our users	1	14%

their patrons/users when considering the use of a Web 2.0 application. As one respondent commented:

> . . .we did hear a lot of feedback from people that when they work with images they wanted the ability to add comments, share information—and we certainly are very attentive to that—most of our photographic images come to us with little or no descriptive information, and although there are different types of descriptive information, we wanted an open system that gave and encouraged people to add comments to images and share information so that the next user would have more available information. (Respondent 1)

Planning and timeframe for application implementation

On the whole, determining which Web 2.0 application(s) to implement involved little planning for the respondents. Three of the respondents (43%) indicated that little planning was done, and in fact, they "just implemented it," while 2 of the respondents (29%) stated that determining which application(s) to implement required some planning. The remaining 2 (28%) stated that a great deal of planning was done. The data suggest that additional time was spent planning the implementation of a Web 2.0 application primarily because the application was part of a larger digitization project or initiative and thus required support and direction from the library administration. This correlates with the timeframe of the actual implementation of the tool. The 2 respondents who indicated a medium- (3 to 5 years) to long-term timeframe (more than 5 years) represent repositories involved in a larger digitization project or initiative, while 4 of the respondents (57%) were not involved in a larger project and implemented the application in less than a year. One respondent had not been employed long and therefore was unable to answer the question.

Additional Web 2.0 applications

Six of the respondents (86%) replied that they are considering the use of additional Web 2.0 applications on their repository websites. Types of applications

include a ratings and review system, blogs, Second Life[53], wikis, and a profile on Facebook. Wikis are by far the most popular application, with 4 of the participants (57%) considering one in the near future. Although the respondents were not asked to explain why they were considering additional Web 2.0 applications, several respondents reported that users in general now expect these applications on a website. One respondent affirmed this view by asserting:

> Now we've been given the technology to do that, and I feel that we're kind of at a point of trying to take our services up a notch and so for example, we're having a lot of younger peer groups that have certain expectations that want something, when they want it, interact with what we do—why write a letter and why go through a bunch of red tape? Why not have a blog where they can comment? We're going to have to do more and more to stay relevant and speak to our stakeholders and less of a technology thing, although the technology is part of making the paradigm [shift] happen. (Respondent 4)

The pros and cons of implementing the Web 2.0 application

Tables 2 and 3 reveal what the respondents think about the pros and cons of implementing the Web 2.0 application(s) on their repository websites. For 4 of the respondents (57%), increased promotion for both their departments and the resources held in their repositories is unquestionably the most positive aspect. Several noted recognition within their institutions and from their peers for their efforts and success in implementing new technology, as well as support

Table 2. Pros of Implementation

Positive Reasons	Number of Respondents	Percentage of Total Respondents
Increased promotion for department and resources	4	57%
Meeting needs of patrons	2	29%
Potential increase in number/types of users	2	29%
It was easy to implement	2	29%

Table 3. Cons of Implementation

Negative Reasons	Number of Respondents	Percentage of Total Respondents
Time	5	71%
Lack of consistency with descriptive standards	2	29%
Lack of control over content	1	14%
Lack of technical expertise	1	14%
Creation of sophisticated metadata	1	14%

[53] Second Life is an online, three-dimensional virtual world that enables its users, called "Residents," to interact with each other through avatars, thus providing a level of a social network service combined with general aspects of a "metaverse."

and reinforcement from their peers that it "was the right thing to do." My sense is that the encouragement from peers seems very important to several of the respondents, particularly in motivating them to continue to innovate and experiment with different technologies.

The amount of time necessary to *maintain* the application (see Table 3), specifically as it relates to "taking away" time from traditional archival duties, is the dominant drawback of implementation. Five of the respondents (71%) acknowledged that they need extra time to keep the information in these applications current, for example, posting entries to a blog or posting new digital objects to a community website, and that balancing these new responsibilities with existing ones is challenging. However, this obstacle does not appear to deter any of the respondents from using their particular Web 2.0 application(s) or planning to implement additional ones. One respondent summarized what many think about this barrier:

> You have to decide whether you are really serious about doing this and then need to find the time to do it. At times technology is not the barrier; it's the people committing to it and saying this is what we want to do and identifying if it's part of your mission. (Respondent 4)

Two respondents (29%) said lack of consistency with descriptive standards is a downside to implementation. As patrons add comments to blogs and digital images or as repositories upload digital images to community sites or even to their own homegrown content management systems, archivists struggle to capture and integrate them into their systems. They also must determine which and how much structured metadata to include on an external Web 2.0 application, particularly if the application does not support professional metadata standards.

Implementation challenges

A majority of the respondents (5) found no major challenges in the implementation of the Web 2.0 application. In fact, 4 of the respondents (57%) feel that from both a technical and time standpoint, the applications are relatively "easy" to set up, although upon further examination, it appears that the level of technical expertise required depends on the type of application being implemented. For content management systems such as CONTENTdm, the intellectual work behind creating detailed metadata and organizing large amounts of materials is not only challenging, but also very time consuming. The respondents suggest that blogs are perhaps the least technically challenging application to implement primarily because the greater library system has previously implemented them so the programmatic aspects already exist.

The greatest benefit to implementation

As shown in Table 4, the respondents think the most significant benefits are the promotion of repository collections and increased use of materials by patrons, both interrelated. Four of the respondents are optimistic about the idea of taking content into the Web environments by employing tools that people use. As one respondent mentioned, "It helps cast, what I feel, is the correct tone that we're progressive and forward thinking even when we collect historic materials" (Respondant 1). In the same vein, 3 of the respondents (43%) have seen a noticeable increase in requests for the use of photographs and other digital images, not only online, but onsite as well. One respondent noted that "Now when we have classes, not only do we bring out the traditional archival resources, but we show them the digital. And we've seen increased use because of that—not only use in digital assets, but it brings them in to see the original" (Respondent 2).

Another interesting aspect of using these applications is the benefit to the archival or special collections staff. It increases their technical skill set, and, in two cases, the professional skills to take on new digital projects and manage them well. Using these applications also improves how a unit manages its digital objects. Two respondents indicated that they achieved better control and organization of their digital objects on the Web by implementing some of these newer technologies.

Feedback from patrons

Five of the respondents (71%) answered that feedback from their patrons has been positive, but that they have only anecdotal evidence. First, none of the respondents track use using a formal feedback mechanism. Consequently, no "hard evidence" exists that the patrons like or dislike the Web 2.0 application or find it useful or not useful. Four reported receiving some positive comments on blogs and photographic images, but these data are not being formally tracked. Second, 5 of the respondents (71%) indicated that while feedback is positive, it is too early to tell if patrons regularly use the Web 2.0 application. Respondents speculated that patrons are not familiar enough with the technology (i.e., not accustomed to adding comments to a blog or photograph) and that the application had

Table 4. Benefits of Implementation

Greatest Benefits	Number of Respondents	Percentage of Total Respondents
Promotion of our collections	4	57%
Increased use of materials by patrons	3	43%
Increased management of digital objects	2	29%
Improved skill set of our staff	2	29%
Increased donations from patrons	1	14%

not been available long enough to warrant responses. While some respondents seem disappointed not to have received the level of response they expected, all appear confident that this will change. One respondent reported considering "tweaks to the system" to increase patron interaction; 2 are intensifying their efforts to promote the application(s) on their repository websites; and 4 respondents are merely taking a "way and see" approach.

Support for the application

Six of the respondents (86%) indicated that they had the support and encouragement to pursue these types of implementations. Although 4 of the respondents were free to experiment with different applications without formal approval from library administration, 3 had to undergo a process to gain support from the library administration. Regardless of the process, overall support for these types of implementations are noticeably enthusiastic.

Respondents' experience

All 7 respondents (100%) stated that the implementation of their Web 2.0 applications has been a positive experience; Table 5 illustrates the reasons why. The implementation and use of Web 2.0 applications not only transforms the services offered to patrons but benefits the repositories as well by the addition of staff and externally funded projects and by giving staff new technical and professional skills. However, the data suggest that the respondents' most significant experience has been the promotion of their respective collections.

Encouraging others to adopt Web 2.0 applications

Respondents enthusiastically encourage others in the profession to adopt the newest generation of Web applications as 100% answered "yes" when asked

Table 5. Respondents' Experience

Respondents' Experience	Number of Respondents	Percentage of Total Respondents
Great way of promoting our collections	3	43%
Transformed how we do certain things	2	29%
Low impact in establishing/maintaining	2	29%
Developed additional externally funded projects	1	14%
Hired additional staff	1	14%
Significant for our profession	1	14%
Learned new things	1	14%

Table 6. Reasons for Encouragement

Reasons for Encouragement	Number of Respondents	Percentage of Total Respondents
Helps us be ready to take on new directions	3	43%
Can help us meet the needs of our patrons	3	43%
Takes advantage of new technology	3	43%
Can reach nontraditional users	2	29%
Another means to tell people why archives/collections are relevant	2	29%

if they do. Table 6 summarizes their reasons. It is interesting to note that, although they displayed a high level of enthusiasm for the Web 2.0 applications, many of the respondents cautioned that the adoption of any new technology means understanding not only the limitations of the application(s), but also one's own limitations and comfort level with implementing something new. As one respondent advised, "You kind of have to know your limitations—whether it's financial or technical—there are so many areas where you could bite off too much and you don't want to do that. I feel that you want to have a couple of things that you can do and do well" (Respondent 1). In addition, understanding the repository's mission and how this new technology supports it also appear to be critical. As another respondent observed, their mission is to be more of a "storehouse of knowledge" and therefore they are more open to considering new directions "to be out front on certain things" than perhaps other institutions with different missions (Respondent 2).

Regardless of these caveats, 5 respondents share the sentiment of the respondent who concluded, "If you can manage the changes, then people should 'make that jump', step out of your comfort zone, and use it to your advantage" (Respondent 1).

Discussion

This exploratory study suggests that many archival professionals *are* embracing Web 2.0 to promote their digital content and redefine their relationship with their patrons. Although they do not have formal feedback mechanisms for measuring this, many respondents want to reach a wider audience because they feel they have materials of value that are not necessarily exposed on the Web. They suggested that employing these tools could give them the ability to do just that.

Although they have little evidence of whether the end users of these applications see them as being positive or negative, the respondents feel that patrons find them to be useful. Though lacking clear evidence that these blogs, community sites, and rating and review systems are experiencing a high level of traffic, the anecdotal data suggest that their unexpected side benefit is an increase

in use of the materials in the collections. Respondents spoke of spikes in patron requests for scans of digital objects, more patrons donating materials to their collections, and an increase of patrons wanting to see the original materials.

Time concerns these respondents, who acknowledge that they grapple with balancing more traditional archival duties with maintaining and staying current with these Web applications. Indeed, the struggle continues as the quantity of records to appraise, accession, and process grows, and the public increases its expectations of accessing and interacting with content on the World Wide Web. However, it is my impression that this challenge deters none of the interview respondents, who seem ready to address it head on. Most recognize that their users will have different expectations when it comes to interacting with the archives, and they are proactively taking steps to meet those expectations. As one respondent concluded:

> . . . you really have to stay current and project an image of currency in terms of technology. I think that's vital just for general public relations; but probably more importantly, the future researchers that are going to use our collections—they're millennials[54] and they expect us to be on the Web, easily accessible, interactive, multimedia—they're just not simply going to use our collections if they're not easy. Millennials make it clear that convenience is really important to them, so they're going to want to see things digitized with keyword searches in multiple formats of the same record—I think that now you have to make this a main thing that you do—there is so much competition for information out there. (Respondent 5)

Conclusion and Future Research

The archival literature reveals the need for archivists to embrace technology to remain vital and essential to current and future users in the digital era. This exploratory study suggests that a number of archival professionals are moving in this direction. Archivists must explore whether their profession is meeting the changing needs of its users through implementation of the latest Web technology. The handful of existing blogs and wikis addressing the topic demonstrates some interest by archivists in Web 2.0 applications and how these applications could potentially benefit both the archival community and its users. Continuing research is crucial as the profession explores its relationship with technology and its users. For example, studies are needed to

- Explore the definition of Web 2.0. It appears that there are many different interpretations of this definition and what it really means to the profession.

[54] Millenials are generally defined as people born between 1980 and 2000. They're typically described as being more affluent, better educated, and more ethnically diverse, with a focus on teamwork and achievement. They tend to have a more intimate connection with technology.

- Examine archival or special collection repositories with digital collections that *have not* implemented a Web 2.0 application to gain an understanding of the barriers to implementation.
- Examine attitudes toward Web technologies and whether these applications have a place in the archival profession.
- Explore whether the size, budget, and staffing of a repository influences the implementation of new technologies.
- Collect user data (not relying only on the perception of archivists) to determine whether patrons find these types of Web applications useful.

Archival repositories will continue to navigate their way through and sort out issues associated with digital collections and Web 2.0 technologies. Such research will spur discussions to guide the archival profession as it adopts Web 2.0 tools.

Appendix 1

Known Archival Repositories Implementing Web 2.0 Applications

1. Polar Bear Expedition: http://polarbear.si.umich.edu/
2. Plymouth State University: http://beyondbrownpaper.plymouth.edu/
3. Duke University Archives: http://www.flickr.com/photos/19219926@N04/
4. Michigan Technological University, Keweenaw Digital Archive: http://digarch.lib.mtu.edu/
5. M. E. Grenander Department of Special Collections and Archives: http://liblogs.albany.edu/grenander/
6. Yale University Beineke Library: http://brblroom26.wordpress.com/
7. Ball State University Archives and Special Collections: http://bsuarchives.blogspot.com/
8. Hugh Morton Processing Blog (UNC-Chapel Hill): http://www.lib.unc.edu/blogs/morton/

Appendix 2

Interview Questions

1. What was the impetus for including this/these application(s) on your repository website?
2. What planning was done for determining which applications to implement and then implementation? (i.e., timeframe)
3. Are you considering any additional applications? Which ones?
4. Pros/cons of implementing the Web 2.0 application on your repository website.
5. What were some of the challenges in implementing this/these application(s)?
6. What has been the greatest benefit of this implementation?
7. What has been the feedback from your patrons? How are you receiving this feedback?
8. Was it effortless or difficult gaining support for this implementation? (i.e., was it supported right away or did you have to convince anyone?)
9. Overall, do you think that this has been a positive experience? Why or why not?
10. Would you encourage others in our profession to adopt these applications? Why or why not?
11. Is there any additional information that you would like to include?