The anatomy of a World Wide Web library service: the BONES demonstration project

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In 1994, the John A. Prior Health Sciences Library at Ohio State University began to develop a World Wide Web demonstration project, the Biomedically Oriented Navigator of Electronic Services (BONES). The initial intent of BONES was to facilitate the health professional's access to Internet resources by organizing them in a systematic manner. The project not only met this goal but also helped identify the resources needed to launch a full-scale Web library service. This paper discusses the tasks performed and resources used in the development of BONES and describes the creation and organization of documents on the BONES Web server. The paper also discusses the outcomes of the project and the impact on the library's staff and services.

INTRODUCTION

Many health care disciplines and agencies have begun to use the Internet's World Wide Web to deliver time-sensitive information. Both the National Institutes of Health (NIH) and the National Library of Medicine regularly publish and update their information using the Web. For example, traditional resources such as the Morbidity and Mortality Weekly Reports and the NIH Guide to Grants and Contracts are made available in electronic form days—even weeks—in advance of the print versions.

The usefulness of these and other Internet resources to the busy health professional can be enhanced with the involvement of the health sciences library using the Web. Traditionally, the role of libraries has been to acquire, organize, and make accessible information in a wide variety of formats. By expanding the range of formats to include Internet information resources, a health sciences library can support the growing demand among their clients for access to networked resources.

To explore the potential of the Web to meet this demand, the John A. Prior Health Sciences Library at Ohio State University initiated the Biomedically Oriented Navigator of Electronic Services (BONES) demonstration project.* The Prior Library serves a large community of health professionals and students from Ohio State University Medical Center, Columbus Children's Hospital, the Arthur C. James Comprehensive Cancer Center, and a multidisciplinary health sciences campus. Together these primary patron groups encompass about 6,000 physicians, nurses, students, and administrative staff members. The library is also a member of the National Network of Libraries of Medicine's Midwest Region, the Committee on Institutional Cooperation (CIC), and the OhioLINK statewide electronic resource network.

The original goal of BONES was to explore how access to Internet resources could be facilitated through use of the Web to organize information in a systematic manner. A secondary goal was to see if the Web could deliver a variety of electronic library services to users' desktop computers.

BONES was an unusual implementation of an electronic library service because it was developed without any formal committee involvement. While endorsed and supported by the library administration, the project began with no budget and only a part-time reallocation of one employee's time. No one involved had previous experience in setting up, organizing, or even maintaining a Web server system. These circumstances were an advantage at times, permitting experimentation and creativity to guide the evolution of the project. This approach allowed BONES to mature at a brisk pace. However, these circumstances were also a disadvantage in that key

* The uniform resource locator for BONES is http://bones.med. ohio-state.edu.
library staff members, such as the heads of collection development and reference, had little direct input in the process of selecting and organizing the resources.

WHY THE WEB?

The Web originally was developed at the European Particle Physics Lab (CERN) in Geneva, Switzerland, to facilitate access to networked resources, scientific preprints, and other professional communications [1-2]. Originally designed around UNIX-based workstations, the Web came to the average user's desktop with the release of the National Center for Supercomputing Application's Web "browser" software, called Mosaic. The benefit of Mosaic and subsequent Web browsers is the bundling of several Internet protocols, including file-transfer protocol (FTP) and Gopher, into a unified tool. The capability of the Web to use these protocols to send and receive sound and image files supports the visual orientation of the health care professions [3].

The Web is a hypertext, multimedia Internet protocol that allows any word or image in a document, or "page," to become an interactive link to other documents or resources elsewhere on the Internet. This effect is achieved using the hypertext transfer protocol (HTTP) [4]. The cross-referencing of interconnected links among documents allows the information provider to construct multiple access points to Internet resources. The user, seeing the hypertext reference, can access a resource without knowing where it is physically located.

The Web is based on the client/server model of computing. Simply described, the client is the computer requesting information, while the server is the computer providing the information. The Web client software, or browser, allows the user's computer to work independently from any single server, calling up and connecting only long enough to transfer the Web document. Unlike traditional online services where a connection is maintained throughout the interaction, the time required for information transfer from server to client ranges from a few seconds to a few minutes [5]. The client/server model takes advantage of the power of the user's computer and reduces the power required of an information provider's server.

BONES SERVER CONFIGURATION

There was no need for a large investment in proprietary hardware and software to start the BONES demonstration project—a critical advantage, due to the lack of a budget. Client/server technology allowed BONES installation on an existing 486/66 personal computer (PC) running the Windows 3.1 operating system. This workstation contained 8 megabytes of memory, a 250-megabyte hard drive, and a direct connection to Ohio State's segment of the Internet, called SONNET. This computer was used simultaneously with the BONES server and a personal workstation.

Economics dictated that BONES rely on software site-licensed by the university or available over the Internet through educational licensing agreements. In fact, most of the software used for BONES is available on the Internet. The availability on the Internet of the Web server software called Windows HTTPD made the BONES project possible [6]. Windows HTTPD and similar PC-based Web server packages have made it easy to develop Web projects.

The configuration just described worked for the limited scope of the project. However, because the server doubled as a personal workstation, its reliability began to decline as overall usage increased. The computer sometimes froze and required periodic rebooting. As the number of potential uses for BONES grows, a dedicated desktop computer will be needed to provide a consistently high level of service.

Figure 1 details the increase in use of the BONES home page during the first months of service. These numbers include users within the library and elsewhere at Ohio State, as well as outside the university. Over time, more of the accesses were from outside the organization and even the United States. This increase in outside use was attributed to the global nature of the Internet and the ease of informal communications.

CREATION AND ORGANIZATION OF BONES DOCUMENTS

Once the server software was installed, the next task was to create the BONES documents using the hy-
The BONES (tm) HomePage

- **BONES Internet Service** starting points for the health professional.
- **The Prior Health Sciences Library page** includes information about hours, services, policies, and access to **The Prior Library Reference Desk**.
- **Internet Search Tools and Assistance** including information about the Internet, World Wide Web, Gopher, etc. Also includes access to the various search indexes.
- **Server Statistics and Patron Comments**

Please send any comments to **BONES Editor** at schnell.9@osu.edu

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Hypertext markup language (HTML) [7-9]. The first BONES home page was created by modifying a sample home page document, which was included with the Windows HTTPD software. A copy of the file containing HTML coding was printed, and the code was compared with the way the page appeared on the screen. Then the ASCII text within the sample HTML document was modified using the notebook editor that comes with Windows 3.1.

While HTML coding can be done manually in this manner, a growing number of software programs can be used to construct HTML documents. Several of these programs were used during the demonstration project, including two available via anonymous FTP called HTML Editor and HTML Assistant [10-11]. These programs simplified the writing of documents because they display “buttons” marked with graphic symbols corresponding to most of the basic HTML codes. Much of the library information made available on BONES already was written in the form of electronic memos and newsletters. These documents were converted from word processor to HTML using a macro. The documents then were cleaned up using the HTML editors. As additional Web documents were written for BONES, templates were created that allow documents to be written quickly with all the basic structural elements already included.

A combination of approaches was used to organize
BONES resources, so that users could search using their preferred organizational method. The basic arrangement of resources on each BONES document was chosen based on informal feedback from faculty, library staff, and librarians inside and outside of Ohio State. The BONES home page offers four main choices, as shown in Figure 2.

The BONES Internet Service is organized to make it simple for researchers, teachers, and students to locate Internet resources. As in the traditional library, the Health Sciences Library and Reference Desk provides information about library policies and services in addition to Internet ready reference resources. To assist with locating information, the Internet Search Tools and Assistance selection provides access to general information about the Internet, including the Web. Each of these BONES documents contains specific Internet resources listed in alphabetical order. Figure 3 provides an example.

Finally, an internal organizational scheme was needed for the documents. A simple hierarchy of directories and subdirectories was established on the server to enable collection of related documents. For example, all documents associated with the BONES Internet Service are kept in a single directory. This approach not only keeps the documents neatly organized, but also makes it easy to locate files for maintenance.
OUTCOMES AND POTENTIAL

As the BONES demonstration project evolved, it became obvious that the most significant resource needed to develop a library Internet service is staff time. Staff resources are needed to write and maintain Web documents, develop marketing plans, construct user education programs, and develop an overall strategy and goals for the library Web service. It is equally important for librarians to include time for locating, selecting, and organizing electronic resources in their regular collection development duties.

Early feedback indicated that BONES users were concerned about the high probability of following a wrong or erroneous link to an unwanted resource. In response to this concern, each list of resources on BONES now includes a brief annotation explaining what the user will find when the link is selected. Such annotations can be seen in Figure 3. Users also were concerned about having to remember where a specific resource is located. The ease of inserting hypertext references into Web documents permitted the library to build redundancy into the resource organization. With multiple access points, the user is not limited to a single resource path and can access all resources from a variety of paths.

An unexpected outcome of BONES was the use of the server to perform remote library lectures, presentations, and demonstrations. Once a library presentation is written in HTML format, it is placed on the BONES server. The lecturer then uses a remote computer and video projector to access these documents when delivering the lecture. The lecture outline can include Internet hypertext links, so the presentation becomes interactive. The librarian presenting the lecture takes a copy of the HTML files on a floppy disk as a backup, in case the BONES server goes down.

Fiscal constraints made it necessary to seek out existing hardware resources to support the incorporation of graphics into BONES documents. To insert images, the library used the color scanner attached to the Ariel Internet document delivery workstation. Other university departments were willing to share their imaging hardware, such as copy stands and digital cameras. Many of the images inserted into BONES documents didn’t require specialized hardware because they were downloaded from various anonymous FTP archives.

The BONES project demonstrated that knowing how to use FTP is an important Internet skill. This protocol was needed not only for retrieving Internet resources, such as graphics and images, but also for updating Web documents. Once the initial BONES pages were written and installed on the server, FTP was used to update the documents.

Finally, the library began experimenting with uses for Web forms. These fill-in-the-blank documents have the potential to allow the user to ask a reference question, place document delivery requests, and make general comments about the library—all at once. The Prior Library is interested particularly in using forms to provide services and answer user questions electronically during the library renovation, scheduled for 1995-1996.

DISCUSSION AND CONCLUSION

There is increasing demand from health professionals for access to electronic information, including that available on the Internet. This information needs to be accessible from the desktop workstation in the office, in the home, or at the patient’s bedside. As the number of services providing access to the Web grows, so will the number of health care professionals with access. The BONES demonstration project not only has made it easier for the health professional to utilize Internet resources, but also has enabled an expansion of library services.

The number of potential health sciences subject areas that can be incorporated into a Web site is quite large, so libraries need to set up cooperative Web collection development efforts. One such project, HealthWeb, which involves health sciences libraries at the eleven CIC institutions, is already under development. Each participating library will be responsible for developing and maintaining a small number of subjects, based on areas of excellence identified by each institution. This collaboration not only reduces the number of subject-related resources each site maintains, but also helps strengthen existing cooperatives.

As an extension of its outreach services, the library sees BONES and the Web as opportunities to sponsor services for local agencies, groups, or organizations that do not have the means to produce Internet information on their own. Two such projects already under way are the Medical Heritage Center Exhibit Hall and the Midwest Chapter of the Medical Library Association (MC/MLA) ’96 home page. The Medical Heritage Center Exhibit Hall will provide information and materials selected from the Prior Library’s history of medicine collection and from the university archives [12]. The MC/MLA ’96 home page contains information about its 1996 Annual Meeting, to be held in Columbus, Ohio [13].

After the initial goals of the demonstration project are achieved, BONES will move onto the next phase of development. The library is establishing an Electronic Resources Committee, which among other responsibilities will act as a steering group for BONES development. While the lack of such an oversight committee expedited the initial stages of the project, the potential impact of BONES on every library department made the committee necessary. This group
will develop formal goals and help guide the development of new services. The committee also will work with subject specialists to write an electronic collection development policy. The roles of departments such as technical and access services in the BONES project also will be investigated.

In conclusion, the BONES demonstration project was successful beyond expectations. The original goal of organizing Internet resources in a systematic manner was reached, as was the goal of facilitating the health professional's access to Internet resources. BONES and the Web now are being viewed as ways to extend traditional library services. While it will not replace existing services, BONES provides the Prior Library with another way to assist patrons in meeting their informational needs.

REFERENCES


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