Collaboration in User Interface Design, or Bringing the Public Service Perspective to Building a Digital Library

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There has been a long-standing belief in the field of librarianship that there are two distinct branches to the profession: technical services and public services. These two areas are often seen as completely disconnected, and perhaps even mutually exclusive. Yet, it has been argued that there are far more commonalities than differences between these two groups of practitioners. Years ago, OCLC distributed a button that read "Cataloging is a Public Service." This was just one example of technical services librarians reminding the profession that the role they play is just as important a service to the public as the services provided by reference and instruction librarians. As libraries increasingly look to give their collections a strong digital presence, many of the librarians involved come from traditionally technical services oriented areas: catalogers, systems librarians, web developers and database specialists. While the landscape is a very different one, the public services orientation and necessary commitment to library patrons is very much the same. Collaboration between representatives of public services, collection development, and technical services is essential to develop successful digital libraries. These three groups bring a variety of perspectives to the table, including knowledge of collections and context, familiarity with users and their needs, and the technical and organizational skills to effectively apply metadata and build interfaces.

There are five key elements to developing strong digital libraries: system architecture, content digitization and creation, metadata development and application, user interface design, and digital preservation. System architecture, digitization and preservation are all

outside of the public services scope of this article. However, the other two, metadata development and application and interface design, are among the most critical from the perspective of the end user and benefit the most from being informed by a strong public services perspective.

A carefully developed user interface to a digital collection, coupled with good metadata, can approximate a number of other interfaces with which library patrons are already familiar. For example, a good interface can emulate the index of a book, a library catalog or an index of journal articles. Likewise, digital library interfaces can include components that are less prominent in the traditional library system, such as user contributed tag libraries, self-moderating forums or general web-based search engines. An effective user interface can draw inspiration from and combine elements of all of these resources by making creative use of thoughtfully developed metadata.

Without getting into too many of the particular details of cataloging, there are a few points to make about description and its impact on a collection's searchability and browsability. Full text of documents, descriptive summaries, documentation of authorship, the application of controlled vocabularies for genre and subject access, and the equivalent of series or "is part of" statements all help to group materials and are all useful tools for a keyword search type of interface. Common wisdom indicates that most library patrons prefer this single box, Google-like keyword search approach. To this end, the structure of the information to be searched for is irrelevant, so long as it is all present and all indexed.

However, many experts in digital library development do not consider a collection of materials with a single input box search form to be a digital library at all. A digital library is a collection of digital materials with organization and services applied over them. An early attempt at putting this idea into words comes from Michael Lesk: "Digital Libraries are organized collections of digital information."[1] The key word here is *organized*. Without adding value to the digital materials, even at the base level of organizing them, the collection of materials really can't be called a digital library. The Digital Library Federation goes a step further in providing an operation definition of a Digital Library:

> Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities.[2]

This second definition goes even further in describing the kinds of value-added services that digital libraries provide. The concepts of 'structuring' and 'offering intellectual access to' resources illustrates that the single search approach, while a vital component of a good digital library, does not itself a digital library make. If this were sufficient, there would be no need to develop more complicated interfaces locally: simply throw the material up on the web and let Google and the other search engines index it. Why is this insufficient? Numerous web sites, from the corporate sector through higher education

and government, use this approach. Obviously, this is a rhetorical question, the answers to which get into concepts of reliability, authenticity, specificity, searching precision, and relevance, not to mention the overwhelming quantity of materials that are available in digital format.

Interface Design

When dealing with a particular targeted collection of resources, the one-box search interface is only part of the answer. The other elements of interface design are far more complicated and difficult to implement, and are largely dependent upon organizational principles that are in part dictated by the materials themselves. These interface elements share many characteristics with museum exhibits. It's as though a docent is wandering through the collection with the user, pointing out important pieces of information, identifying key documents and emphasizing objects that are representative of the collection's character. This imaginary tour guide is also filling in gaps in the collection's content, providing bits of relevant historical information and important aspects of context, and helping to group materials in different ways depending on the visitor’s background.

Effective metadata provides hooks, off of which a variety of different interfaces can be hung. To extend the museum analogy, works of art will often appear in a variety of different exhibits and their impact and effect will vary depending on the context of the exhibit and the particular story being told. At the simplest, these exhibits take the form of

interfaces that group resources in meaningful or unique ways. Additional information can then be provided in the form of contextual 'wrappers', or pages describing the significance of objects and relationships between them. Increasingly, digital collections will include interfaces where the exhibits and logical groupings of materials will shift into the domain of the end user, allowing digital materials to be utilized in even more unique ways.

Good starting points for specialized interfaces include subject and creator browse lists. In the case of a subject browse list, it is reasonable for this to simply be a list. However, should these lists contain all of the subject terms that are present in the collection? Should they only contain a subset of terms that are more meaningful within the collection's context? Should they include cross-references from one version of a term to another, or just the preferred terms? Should they be in the form of single lists, or should they be divided according to topical subjects, corporate subjects, individual personal subjects and geographic subjects? Some of these questions don't need to be asked until the interface is being built, but others, such as the last, have an effect on the design of metadata. In order to provide dynamic lists for browsing different types of subjects (place names, personal names, topical subjects), the data must be stored in separate metadata fields. Otherwise, the lists have to developed and maintained statically, which takes a considerable amount of human effort.

Again, the browsing environment is considerably different than the search environment. Browsing is designed for a different type of user. Her journey into a given digital

collection is not focused; it isn't about finding a specific answer to a specific question. The purpose of this user's exploration is more akin to the purpose of a museum visit: unfocused, general study and the broadening of knowledge and interest. For the benefit of this type of user, browse interfaces effectively collocate similar or related resources. An example may be a list of sub-collections (http://libweb.uoregon.edu/catdept/digcol/gh/collectionBrowse.html) or of resource creators (http://libweb.uoregon.edu/catdept/digcol/gh/photographerBrowse.html). Providing a variety of different ways to categorize and group the resource in a digital library leads to more options for intellectual access, which leads to a greatly enhanced user experience. Additionally, browse interfaces are much more useful when they include contextual information. An example may be a list of artists or collections that provides some background into the artist's artistic style, life and times, or significant contributions to the art form. Likewise, a list of sub-collections, organized in the same way as their physical counterparts, can include information about the collector or donor and the subject matter of the constituent images. These brief descriptions can even be linked to more thorough descriptions, which librarians can easily derive from existing finding aids. A list of locations or of people depicted in photographs may also benefit from this kind of additional context.

Context as a Design Principle

To provide useful descriptive information, and leverage that information in effective user interfaces, requires a thorough grasp of the context of the collection. Often, database designers and web developers do not have this contextual information. In many cases, even the catalogers who are describing objects in the collection lack this perspective at the outset of a project. To truly incorporate these elements of context into collection design requires a collaborative atmosphere. Web designers, catalogers and metadata technicians must work in close consultation with the curators and end users of each collection in order to provide interface components that mimic museum exhibits as discussed earlier. When this collaboration is done well, the result is an interactive and personal experience for the end user.

Trying to enable this sort of experience in a medium that is by nature very impersonal and static is a difficult task. It requires thinking about different approaches to the material in advance. The designers of the digital collection must begin by working closely with the curators of the physical collection. These collection curators are frequently the same people who provide reference and instructional services for the materials that they curate. Usually archivists and special collections librarians, they are generally quite intimate with the relationships between items in their collections and are familiar with various groups of users who find these materials valuable.

A significant component of this contextual information is related to the organization of and relationships between all of these archival materials. This is an example of how the union of technical and public services is a multi-directional path. Organization of

information is generally considered the domain of the technical services librarian. However, in the case of archives and special collection materials and specific knowledge domains, effective user support services require strong knowledge of the collections, how they are organized and categorized, and how they can be divided into smaller sub-collections to meet a specific research need. Additionally, a curator with a strong understanding of the organization of information is better able to arrange her collections, leading to improved public services in special collections.

Related to these organizational considerations are the selection criteria for building the digital collection itself. In most cases, digitization of an entire collection of materials is an untenable short-term goal. A subset of materials that are either representative of the collection or focused on a particular topic or theme must be identified during the planning stages of any good digital collection. These decisions, in turn, affect the application of metadata and the design of the web interfaces, or 'wrappers', for the online collection.

A good example of this kind of interpretative approach to interface design can be seen in the University of Oregon's Office of the President collection (http://libweb.uoregon.edu/catdept/digcol/clark/index.html). To understand the issues related to this particular collection, it is important to first discuss a bit of the collection's background. This collection was initially built in conjunction with an undergraduate course, the Honor's College Arts and Letters Colloquium: The University in Peace and War (http://honors.uoregon.edu/). The course focused on the UO presidency of Robert D. Clark, from 1969 through 1975. Clark's presidency took place during a very

tumultuous period in US history, a time when University campus life was profoundly impacted by student unrest, the peace movement, and the civil rights movement. The shootings at Kent State took place during his time as University President.

As part of their coursework, students worked with the University Archivist to select items from the University Archives that were representative of the issues, events and decisions that characterized Clark's presidency. The University of Oregon Libraries digitized the selected documents, performed optical character recognition (OCR) on them to provide full text indexing, and mounted them on the Web. These materials were then used as primary source documents for student projects, which were also archived in the UO's Institutional Repository, Scholars' Bank (https://scholarsbank.uoregon.edu/dspace/handle/1794/309)

When the course was finished, the collection was expanded to include materials from the Presidential Papers of other UO Presidents from the 1960s and 1970s, as well as other supporting material. The focused nature of the collection, and the desire to provide access to the materials most representative of a distinct cultural environment led to the decision to organize this material in broad themes. These themes are represented in the cataloging and provide an interesting mechanism for browsing the collection.

The themes chosen were: Civil Rights, Free Speech and Demonstration, Poverty, and Vietnam and ROTC. A fifth theme, Key Documents, was used to highlight selected items that were deemed most crucial for understanding the subject matter. An interface

was designed that leveraged the metadata to allow users to browse each theme, to browse only the 'key documents' within a theme, or to browse all 'key documents' across all four topical themes: http://libweb.uoregon.edu/catdept/digcol/clark/themeBrowse.html. It should be noted that cataloging and scanning both continue for this project; the current themed interface does not necessarily retrieve a comprehensive set of documents for each category.

In addition to the assignment of broad thematic categories, catalogers continue to apply subject headings, date materials, identify collections to which materials belong, and provide various other access points. The result is a collection that can be accessed in a variety of different manners depending on the perspective and need of each individual user.

Format Specific Considerations

Another factor that has an effect on both database and interface design is the format or formats of materials that are included in the collection. Approaches to description and access vary significantly based on format.

The Office of the President collection described above makes use of optical character recognition to provide full-text indexing and searching capabilities. This greatly increases the utility of single-box searches and reduces the need for descriptive summaries, since the resulting document is generally keyword searchable.

Images, on the other hand, do not purport to tell the user anything about themselves. A cataloger uses a completely different approach in the case of images, focusing first on what the image is of and describing objects and elements depicted in the picture. Secondary to these general descriptions are descriptions of the picture's "aboutness." These descriptions require much more care because the cataloger must avoid inserting his personal perspective or interpretation on the picture in question.[3] In many cases, such interpretation is based heavily on the cultural, emotional or intellectual context of the viewer. Objective analysis of an image's meaning should be left to art historians, anthropologists, sociologists and the creators, artists and photographers who create such images. Similarly, metadata and interface decisions will vary for collections that contain audio or video.

Ease of site navigation and general website usability are also issues here. Unlike the museum curator, the collection designer has little control over the order in which users view and explore materials. There is no floor plan and traffic flow that encourages sequential collection usage, making it quite challenging to use a collection to tell a specific story. A particular sequence of events can be approximated using timelines or a story can be told using a sequential set of pages to approximate a narrative, but it is challenging (and perhaps not even desirable) to try and encourage the visitor to adhere to such a sequence.

Many who browse a collection don't start out as seekers of serendipity, and even more rarely do they come into a collection through the front door, or home page. Frequently, server logs indicate that users come to a digital collection through a very specific search in an external search engine. Hopefully, these visitors will find their information need fulfilled, but will continue to browse the collection and experience more than just the one corner that pertained to their original search request. This is the purpose of the museum-like architecture that I've been describing. The indexing and keyword searching is to get the user there and to enable the focused research need to be met. The browsing is to get them to stay, experience, learn and develop additional information needs that will lead to further searching and exploration.

Additionally, some collections offer a wide range of formats within a single metadata framework and user interface. In these cases, the inherent differences in the way textual documents, images, audio, video, and geographic resources are described make the development of a powerful user interface even more difficult. Just as materials can be grouped according to collection or artist, format provides another very useful construct for generating lists to browse a collection. A list of the media-types or formats that are available may become an even more useful entry point when it is accompanied by descriptions of the materials to be found in each category and perhaps even a discussion of the selection criteria that have been applied.
(http://libweb.uoregon.edu/catdept/digcol/wwdl/formatBrowse.html)

Audience

Many of the above decisions are dependent upon the primary audience of the collection. A site designed for K-12 students is going to differ from one designed to aid the research of university graduate students and faculty. Some collections are designed for educators, some are designed to assist in the development of government policy and some are designed to help various societal groups to explore, preserve or reclaim their cultural heritage. Each of these examples involves significant differences in how interfaces are built and what metadata is captured.

Many digital collections tend to be designed with the general public as the target audience. These can be the most challenging to develop, as the public tends to share many characteristics with all of the previously mentioned groups.

These are only a small selection of the possible target audiences toward which a collection may be geared, and each audience involves a different set of challenges and requires the application of different principles.

The myriad possibilities can be a bit overwhelming, but establishing a target audience at the early stages of collection development has the potential to make or break the successful implementation of a digital library. This is because the specific end user population can be afforded the opportunity to have input into the process from a very early stage and can continue to provide feedback as the collection evolves and grows.

An example of such a collaborative process can be seen in the collaborative development of Picturing the Cayuse, Walla Walla and Umatilla. The project, jointly developed by the University of Oregon Libraries and the Tamástlikt Cultural Institute (TCI) of the Confederated Tribes of the Umatilla Indian Reservation, is a good model for effective collaboration between the owner of material and the end-users of a digital representation of that material.

From the beginning of this project, TCI, a museum and center for cultural history, was involved. The basis of the project is a set of approximately 8,000 glass plate negatives held by the University of Oregon Libraries. The photographs, taken by Major Lee Moorhouse, an amateur photographer who served as an agent on the Reservation in the late 19th and early 20th Centuries, depict places, people, events and ideas that are of vital importance to the Tribes' cultural heritage.

The metadata for this collection includes parallel descriptions produced by library staff and by TCI museum curators, who are also members of the Confederated Tribes. The resulting interfaces, as well as the display of, item metadata are designed to leverage both sets of metadata, either separately or in concert. When viewing items, there are buttons provided to toggle between different views of the metadata, allowing users to focus on the elements of the description that are most important to them:

(http://boundless.uoregon.edu/cgi-bin/viewer.exe?CISOROOT=/Moorhouse-wk&CISOPTR=111)

Additionally, the collection includes a comment form for other members of the Confederated Tribes to provide additional context and feedback about the images. This results in a collection that presents both a western and a modern Native American perspective into a set of images that bridge these two cultures.[4]

Interactivity and Future Directions

This example raises another interesting point about effective user interfaces. A good user interface has to be interactive. One means of achieving this interactivity is through offering a variety of different targeted browse and search interfaces, as discussed above. This is remarkably useful in pulling the audience into the collection, and allowing them to guide the experience in a way that matches their particular perspective and their frame of reference. However, researchers are beginning to recognize the need to augment this form of interactivity with other even more personalized ways of interacting with collections.

Increasingly, savvy users of information in networked environments want to be able to customize, annotate and personalize the information with which they interact. The resources to which librarians facilitate access, both in the traditional and digital realms, are infinitely more valuable if end-users can incorporate those resources into the very frameworks of their quest for knowledge. This trend is particularly easy to identify in the proliferation of blogs, personal information spaces and the development of what are now being called folksonomies. The ability of users to tag bits of information, photographs,

ideas and documents with keywords that have particular meaning to them is unbelievably powerful. Even more provocative is the ability to take these tags and share them, exploring the information constructs that are being developed by other users.

This way of dealing with information is in its relative infancy, and yet the number of examples is growing exponentially. Currently, most of this kind of development is taking place in the context of unstructured self-published information. However, an increasing number of library and information professionals are becoming conscious of this information trend.

As our users become more and more familiar with the organization, linking and annotations that are possible in the unstructured, self-published world of the Web, they will inevitably come to expect that the same ability to connect and personalize content will be available to them in the formal information environment provided, in both physical and virtual spaces, by libraries. Cyril Oberlander points out that this represents the library's place at a convergence of two very different information spheres. The first is an "author focused" domain, represented by desktop publishing software vendors. The second is the "searcher focused" domain, represented by search engine providers and web directory services. Recent developments have seen the major players in each of these areas beginning to cross the boundary into the other's domain. As a result, each of these areas is moving into what is traditionally the library's domain: an area focused on knowledge, learning, research and growth.[5]

Additionally, more and more tools are being developed that explicitly enable users to group digital objects into their own categories and sets. Examples can be seen in CONTENTdm's My Favorites functionality, and even more significantly in the feature set of the Madison Digital Image Database (MDID) – http://mdid.org/. Interactivity of this nature is becoming very common on the general Web. Early examples of this could be seen at Amazon (http://www.amazon.com/) when they began providing functionality for personal reading lists as well as for user submitted book reviews. This trend has only continued, with user moderated communities such as Slash Dot (http://slashdot.org/) allowing users to submit stories, categorize them, discuss the relevant issues and rank one another's comments on relevance and usefulness. The recent explosion in the number and quality of blogs available has created an environment where anyone can comment on anything, link to, annotate and *add value* to whatever resources they find. Systems such as Flickr (http://www.flickr.com/) and del.icio.us (http://del.icio.us/) now allow users to provide their own 'tags' for all kinds of resources, essentially leading to an informal cataloging of the web.

Developers of digital collections need to begin thinking about our end users' desire to annotate and personalize the materials we present to them. Patrons of the digital library will be increasingly inclined to take part in telling the stories that lie buried within our collections.

Some of this can be achieved through collaboration with representative groups of our target audiences at the onset of developing a digital collection, but it must go much, much further than that. A good first step is to ensure that all digital collections include some kind of easy to use feedback mechanism. This should clearly invite users to submit additional information that may be missing from our cataloging. The users of our collections will frequently have a piece of contextual information that is specific to them. It is very likely that an unidentified person in an image is someone's uncle, or that the unidentified house in the background is someone's grandmother's childhood home. Without a conspicuously placed mechanism for communicating with users, this information will remain uncovered and eventually be lost.

An additional step toward interactivity is to enable faculty and individuals to gather together sets of resources from disparate sources that have special meaning to them. They can provide additional context in the form of their own learning environment and the goals that they bring to their exploration of information online, of which libraries' digital collections are only a small part.

Recently, a future history of the media, from the perspective of The Museum of Media History in 2014, appeared on the Web. [6] This brilliant work takes a look at the eventual result of the increasing tendency of information consumers to interact with the information they provide. By commenting on it, annotating it, selecting and organizing it, they influence the information itself. The line between consumer and producer of information is blurring, moving us gradually toward a world where the roles are merged

completely. In such a world, the information landscape itself is created dynamically in a massive collaboration that involves everyone.

While the video is somewhat akin to science fiction, the world that it posits is not all that difficult to imagine, as the information world is clearly moving in this direction. In such an environment, the role of libraries and librarians changes significantly, although it doesn't become any less significant. As libraries continue to put selections of their resources on the web, to become information providers within this digital landscape, it is increasingly important, even imperative, that these resources become part of this increasingly iterative and dynamic environment. Library resources need to retain their reputation as being authoritative, integral sources for all kinds of research and learning. At the same time, they must adapt to the shifting fabric of the larger information milieu and adjust to its increasingly social nature. To do so requires an exceptional sense of the nature of information users and the processes through which people seek to expand their knowledge and understanding of the world around them. As these transformations take place, the distinction between content provider and end user, between information producer and information consumer, begin to blur and fade away.

Conclusion

Facilitating the use of digital resources in a variety of different contexts and environments requires a great deal of foresight. A good metadata structure provides hooks and access points that can be updated, developed and refined to support future

interfaces. In many cases, future interfaces will take the form of additional browse and search options developed by the collection curators and digital library development teams. These may be temporary exhibits, tours, timelines, clickable maps and better search interfaces with fielded Boolean capabilities and post-search limiters, refinements and sorting functionality. The development of such interfaces is limited only by time, the functionality of digital asset management systems, and the ingenuity of digital library developers. In addition to interfaces, groupings and categorizations developed in house, users will soon come to expect the ability to come up with their own structures and to customize collections to their individual needs.

Catalogers, collection curators and interface designers will not be able to anticipate all of the tools and groupings that may prove useful for collection organization and resource discovery. It will be even more difficult to anticipate the various structures and groupings that end-users will want to impose on these collections. For this reason, metadata and interface design elements need to be flexible enough to allow both resource providers and end users to develop new interfaces, re-organize resources and recombine objects from different collections in new and highly customized ways.[7]

Footnotes

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