

Carmen L. Beard. An Internet Search Interface for the Ackland Art Museum Collection Database. A Master's Paper for the M.S. in I.S degree. April, 2004. 94 pages. Advisor: Stephanie W. Haas

The paper documents the planning and design of an Internet interface to search the Ackland Art Museum's collection database. Preliminary work included reviewing other museum on-line collection databases. The project itself consisted of five parts: a user needs assessment conducted to learn about the system's potential users, developing and testing the design requirements derived from the assessment, the implementation of the proposed system and a usability study to test the system. Conclusions address the problems encountered during the implementation and their resolution, as well as recommendations for future enhancements to the system.

The lessons learned from this project may be used by other museums implementing a similar interface, especially small and medium sized museums such as the Ackland Art Museum. The results of the user needs assessment indicated a strong interest in Internet access to museum collection databases which is a finding that may be useful to grant seeking.

Headings:

Web Interface Design

User Interface Design

Design Processes

Museum websites

AN INTERNET SEARCH INTERFACE FOR THE
ACKLAND ART MUSEUM COLLECTION DATABASE

by
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1. INTRODUCTION

One of the missions of museums is to provide access to the works of art in their collections. The advent of the World Wide Web has significantly increased the ability of museums to fulfill this mission by displaying works of art on their web sites. Museum patrons can see and learn about works of art even when they are not able to physically travel the museum itself. Over the past decade, many museums have made use of the opportunity presented by the World Wide Web and are using increasingly sophisticated technology to make their collections available over the Internet. This paper documents the process of one museum's endeavor to incorporate the use of Internet technology as it works to fulfill its mission to bring people and art together.¹

Four years ago, the Ackland Art Museum purchased the MultiMimsy Collection Management database system (Mimsy)² from Willoughby Associates to assist in managing their collection and would now like to make the collection available through the use of the Internet. To that end, a master's project was undertaken to design an interface to allow Museum patrons and staff Internet access to the Mimsy collection database.

This paper is a discussion of the master's project which occurred during the spring semester of 2004 and incorporated some preliminary work that was completed during the previous year from July to November, 2003. The preliminary work was conducted as part of a field experience at the Ackland Art Museum and consisted of two parts. First, a review of other museum web sites was undertaken to become familiar with the technology and features currently being used by museums to provide Internet access to their collection management systems. The second part of the field experience involved configuring the PHP script provided by Willoughby Associates so it would connect to the collection database. Although the PHP script was going to be replaced by the interface designed during the master's project, it was beneficial to get basic parts of the script working, such as connecting the web pages to the database, because similar features would be used in the new interface.

The master's project was conducted from January to April, 2004 and consisted of four parts. First, a user needs assessment was conducted with the Museum's staff and patrons to determine the design requirements for the interface. The second part of the project used a paper prototype review conducted with Museum staff to test the design requirements gathered during the user needs assessment. The third part of the project was the implementation of the interface, and finally, a usability study was conducted with the Museum staff and a Museum patron to test the interface design. Following is a

¹ Ackland Art Museum. "Ackland Art Museum Mission Statement." Available: http://www.ackland.org/mission_text.html (April 6, 2004).

² Willoughby Associates. (2000). MultiMimsy 2000 (Version 2.5) [Computer software]. Winnetka, IL: Willoughby Associates, Limited.

discussion of each part of the field experience and the master's project undertaken to design the Ackland Art Museum's on-line collection search interface.

2. PREPARATION FOR DESIGN

2.1 - Museum Website Review

The ways in which museums provide Internet access to their collections vary, but often take one of two forms, static web pages and dynamic web pages. The most prevalent form is static web pages where museum curators select the most important works of art in their collections and display these objects on their web pages with detailed discussion about the works' importance. This form of display is limited by the resources the museums' staff have to incorporate works of art into their static web pages.

Dynamic web pages are the second form museums often use to provide Internet access to their collections which allow patrons to search the collection databases used to store information on their works of art. Museum collection databases often include all of the works of art belonging to the museum, which significantly increases the number of objects available to Internet visitors and removes the constraint of limited staff resources to develop static web pages.

However, the use of dynamic web pages can be difficult for museums to incorporate into their web sites because the technical requirements are much higher than those required to implement static web pages. This is particularly true for small museums which generally have fewer resources than larger museums to devote to improving their technological resources. Despite these drawbacks, museums continue to implement this technology on their websites because once the initial difficulties are addressed, the museum's ability to fulfill its mission is potentially increased to providing access to its entire collection to anyone in the world who has Internet access.

This section of the paper is a discussion of the work undertaken during the field experience with the Ackland Art Museum reviewing other museums' web sites to examine how they used dynamic web pages to provide on-line access to their collections. The purpose of this research was to determine the baseline standard among art museum on-line interfaces and the current state of the art to generate ideas about what types of features should be incorporated in the Ackland's on-line collection search interface.

The objectives of the web site review were to discover what types of information are available through on-line collections, the tools that are provided for searching the collections, the tools provided to review the search results, how controlled vocabulary is being used and how on-line collections are being made available for children. This meant the scope of this review was limited only to the section of museum websites using dynamic web pages to provide access to museum collections and did not examine all aspects of museum websites such as exhibition and visitor information and on-line access to museum gift shops.

The websites included in the review were selected by the Museum's registrar and assistant registrar. They included large museums that are respected within the museum

community that the registrars felt could provide information on the state of the art in on-line collection interfaces. Some of the museums included in this category were selected because their search interface had made the news among museums as having done something of particular interest that might be useful in this review. Several smaller museums that the Ackland staff consider to be their peer institutions were included to get a feel for the standard in on-line interfaces for museums with resources comparable to the Ackland. Two of these museums, Albright-Knox and Smith College, were selected because they are using the MultiMimsy database system and the PHP interface that came with the database. Finally, all the schools in the Atlantic Coast Conference (ACC) with art museums were included as another way to gauge how the Ackland compares with its peer institutions. Table 1 lists the museums included in the review.

Table 1 - List of Museum Interfaces Reviewed

Large Museums	
Asia Society	http://www.asiasocietymuseum.com
British Museum	http://www.thebritishmuseum.ac.uk/compass/index.html
Tate Modern, London	http://www.tate.org.uk/home/default.htm
Louvre	http://cartelen.louvre.fr/cartelen/visite?srv=crt_frm_rs&langue=fr&initCritere=true
Hirshhorn	http://www.hirshhorn.si.edu
LACMA	http://CollectionsOnline.lacma.org
Metropolitan Museum of Art	http://www.metmuseum.org/
State Hermitage Museum	http://www.hermitagemuseum.org/html_En/index.html
Seattle Art Museum	http://www.seattleartmuseum.org/eMuseum/
San Francisco Museum of Fine Arts	http://www.thinker.org/index.asp
Cleveland Museum of Art	http://www.clevelandart.org
Peer Institutions	
Albright Knox	http://www.albrightknox.org/
Nelson-Atkins	http://www.nelson-atkins.org/Default.htm
Yale	http://www.peabody.yale.edu/
Harvard	http://www.artmuseums.harvard.edu/
Peabody Museum of Archaeology and Ethnography (Harvard)	http://www.peabody.harvard.edu/col/default.cfm
Smith College	http://www.smith.edu/artmuseum/collections/
Williams College	http://www.williams.edu/WCMA/argus/search-argus.html
Allen Memorial Art Museum (Oberlin)	http://www.oberlin.edu/allenart
Johnson Museum (Cornell)	http://www.museum.cornell.edu/
Univ. of Michigan Museum of Art	http://www.umma.umich.edu/
ACC Museums	
UVA – Blake Archive	http://www.virginia.edu/artmuseum/
NCSU Design Library	http://databases.lib.ncsu.edu/design/slides/search/
Duke University	http://www.duke.edu/web/duma
FSU Museum of Fine Arts	http://www.mofa.fsu.edu
Wake Forest Museum of Anthropology	http://www.wfu.edu/MOA

The first task of the review was to determine the standard tools for searching on-line collection databases and displaying search results. Most sites provided both a “simple search” interface and an “advanced search” interface. The majority of the simple search interfaces take one of two forms. Some of the simple search interfaces provide a single form field for users to enter a keyword and the system automatically searches all the relevant fields in the database (Figure 1). The other simple search interfaces provide individual text boxes on the form for the user to specify the criteria to be searched in each field (Figure 2). The fields available in the simple search interfaces vary, but are often restricted to two fields, one of which is almost always the artist name field.

Figure 1 – Simple Search 1

Search : Who?

To find objects connected with a certain person, enter their name here and click 'Find':

Or click on one of our suggestions below:

To focus your search use one of the following:

[Who?](#) [What?](#) [How?](#) [Where / When?](#)

Figure 2 – Simple Search 2

Artist Name:

Work Title:

The advanced search interfaces are similar to the second style of simple search interfaces, but provide more fields (Figure 3). The fields available in the advanced search interfaces varied among institutions, but most included artist/maker, title, and medium; additional fields available on some sites were culture and date.

Figure 3 – Advanced Search

Keywords

Logic Use **And** with multiple terms

Artist

Country

Period

The templates for displaying results are not as standardized as the forms for entering search criteria. The most widely used displays are a list of thumbnails with basic information (Figure 4) or a gallery of thumbnails with one of two descriptive labels under the thumbnail (Figure 5).

Figure 4 – Thumbnail list

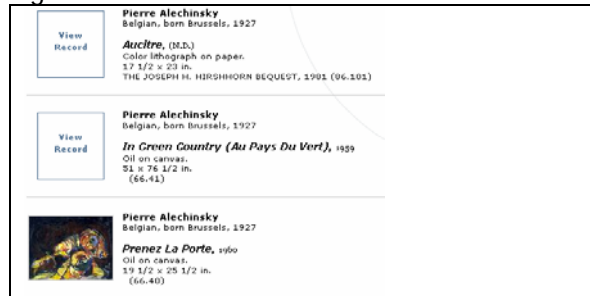
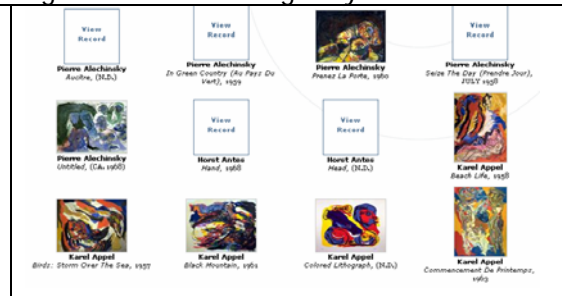


Figure 5 – Thumbnail gallery



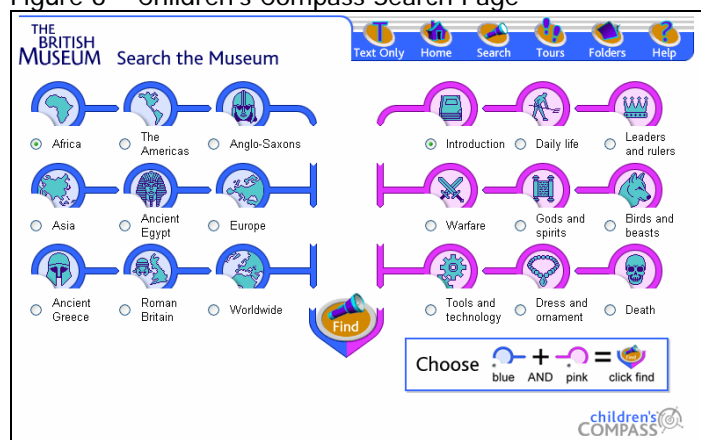
The interesting part of this survey was observing how museums deviated from the standard, either in tools provided to search the collection or in how they displayed the results. Not surprisingly, some of the large museums incorporated more sophisticated functionality, although not always to the advantage of the users.

The British Museum search interface, named COMPASS, varies from the standard search forms in several ways. The underlying database, purchased from a British company, has fields for who, what, how, when and where. These are the fields exposed to the search interface and correspond to artist, medium, date and culture. There is no option to search on the title field. The interface is very easy to use, but there is no true advanced search option. There is a simple search that searches all the fields in the database, but for the advanced option, each form field is listed on a separate page of the interface, so there is a “who” page (Figure 1), a “what” page, etc. There is only one form field on each page. Users can enter multiple keywords in the form field, but the system will only search that one field in the database. This is really problematic because there are thousands of objects in the database and the only way to limit the result is adding additional search terms using Boolean operators in the form field on the simple search. It works really well for browsing, but not well at all for known item searches.

While the search pages have some serious limitations, the pages for displaying the results are very nice and have some interesting additional features. All items include a description and many items include a list of reference materials for further research. It also displays thumbnails of related items in the collection database.

Additionally, the British Museum has the only on-line search database for children among the museums included in this review. Children’s COMPASS (<http://www.thebritishmuseum.ac.uk/childrenscompass>) mimics the main search site, but is completely tailored for use by children. There are no keyword searches, but pre-selected topics that children can mix and match to generate results. For example, a user can click on “Ancient Egypt” and “Birds and Beasts” and see objects of animals in the Egyptian collection. All of the descriptive text in children’s COMPASS is written for children. It is an excellent site, but unfortunately would require a lot of funding to implement, so it was not particularly pertinent to the Ackland’s needs.

Figure 6 – Children’s Compass Search Page



Another museum that has a less than user friendly search interface is the Seattle Art Museum (Figure 7). This Museum does not divide the searches into simple and advanced searches, but lists all of the fields available for the users to search on the main search page. Each field in the list is a hyperlink that takes the users to another page where they select search terms from a list of keywords. When the users are finished selecting keywords for that field, they click the next button which returns them to the first search screen. If the users are observant, they will notice that the bottom half of the screen contains their search criteria and a button to perform the search. If not, the users are left wondering how to perform the search. The interface allows users to keep selecting keywords from different search categories and appends the keywords onto the existing query. After the users have selected the first search criteria, the interface appears to limit the items available for additional criteria based on the first criteria selected.

Figure 7 – Seattle Museum of Art Search Interface



The Seattle Art Museum interface does have some advantages, for example, it allows users to see the queries they are building, but it is not intuitive and has a higher learning curve than traditional search forms. It seems the designers were trying to get away from the ubiquitous search forms, and were trying to make advanced searches easier, but in trying to capture the complexity involved in performing advanced searches, lost some important functionality. With the exception of artist name, search criteria are restricted to the lists of keywords provided by the interface and it appears that searches become narrower with each search term entered instead of broader, meaning the database will try to find only records meeting all the search criteria instead of returning all the records that contain any of the search criteria. This is a limitation of combining the simple and advanced search features. When separated, one search feature can provide a narrow search and the other feature a broad search. This interface also slows down the process of entering multiple search terms by requiring users to go to separate pages for each criteria instead of having them all on one page.

There were two large museums that had some interesting innovations on working with search results. The Hirshhorn allows users to change how the results will be displayed after the search has been conducted. The default display is a list of thumbnails with descriptive information (Figure 4, above), but users can change to an image gallery (Figure 5, above) or a text-only list of the objects (Figure 8, below). This feature is nice because users can switch back and forth within the same result set, and the pages reload quickly.

Figure 8 – List of objects without thumbnail

<p>Pierre Alechinsky Belgian, born Brussels, 1927</p> <p><i>Aucitre</i>, (N.D.) Color lithograph on paper. 17 1/2 x 23 in. THE JOSEPH H. HIRSHHORN BEQUEST, 1981 (86.101)</p>
<p>Pierre Alechinsky Belgian, born Brussels, 1927</p> <p><i>In Green Country (Au Pays Du Vert)</i>, 1959 Oil on canvas. 51 x 76 1/2 in. (66.41)</p>
<p>Pierre Alechinsky Belgian, born Brussels, 1927</p> <p><i>Prenez La Porte</i>, 1960 Oil on canvas. 19 1/2 x 25 1/2 in. (66.40)</p>

Another innovative interface is the Thinker at the San Francisco Museum of Fine Arts. This site is interesting because of the use of metadata. In addition to the information on the object itself, the search results provide keywords to related objects in the database. This helps users become familiar with the contents of the collection and the appropriate keywords to use in additional searches. The site also provides limited zoom capability which allows users to increase the resolution of the images.

In addition to learning what the large museums are doing, the Ackland staff also wanted to know what other university affiliated museums' search interfaces look like. As described above, a number of the larger museums tried to enhance the search tools on their interfaces to make it easier to use, but often only succeeded in making the interface confusing and complicated. The Harvard University Art Museums actually succeeded in their attempt at this endeavor. One of the problems with both the simple and the advanced search forms used on most search interfaces is users who are just browsing the collection do not know what keywords to use. Harvard's simple search form provides a grid with all the letters of the alphabet. Clicking on a letter produces a pop-up window with a list of artists' names. When the user clicks on a name, it is automatically inserted into the artist name form field. On the advanced form (Figure 9), instead of having empty text boxes, Harvard uses drop down lists with values drawn from the database. The techniques used here are simple yet they add usable functionality without making the interface complicated. However, there are some drawbacks; many of the keywords do not produce results when the search is run and the interface requires the users' browsers to support JavaScript.

Figure 9 – Harvard University Art Museums' advanced search interface

The Harvard interface also does a nice job of displaying search results. When available, users are given the option to view information regarding marks and inscriptions, bibliography, exhibition history, and provenance.

Two of the Ackland's other peer institutions, the University of Michigan Museum of Art and the Johnson Museum at Cornell, are using sophisticated software in their interfaces. Michigan does not indicate if they purchased the software or custom built it. Their site allows users to view four different sizes of each image, but this functionality is only available to subscribers³. Cornell is using Luna, a commercially developed software package that allows users to compare images side-by-side and magnify the resolution of the images. As with Michigan, Cornell's images are not available to the general public.

The other peer institutions included in the review did not have any additional features beneficial to the review. The director of the Ackland is concerned that they are lagging behind their peers, but this does not seem to be the case. Two sites were included in the review because they are using the same database as the Ackland, MultiMimsy. One of these schools, Smith College, is using the PHP interface provided with the database with no additional functionality and the other, Albright Knox, has made modifications, but it provides less functionality than the original version.

The ACC museums included in the museum website review also did not provide additional features that were beneficial to the project, but both Duke and State recently bought new software and it is likely they will soon be making significant changes to their web sites.

A report produced by the Institute of Museum and Library Services (IMLS)⁴, found that many museums lag behind libraries in incorporating technology into their institutions. The report surveyed the level of digitization and technology implementation present in libraries and museums in 2002 and broke down the museum results into small, medium and large institutions. According to the report, small and medium sized museums are generally further behind than larger museums. It was not that the museums included in the survey were un-interested in technology, they just lack the funding to implement it.

The results of the review conducted for the Ackland interface seem to support the findings of the IMLS report. Many of the larger museums, such as the Metropolitan Museum of Art, do not have significant portions of their collection available online which gives an indication of the difficulties facing the smaller and medium sized museums.

The review of museum on-line collection interfaces was instrumental in determining both the current baseline standard and the state-of-the art⁵ among museum web sites and

³ For members of the UNC community, the University of Michigan Museum of Art's restricted interface can be viewed by logging in through the UNC proxy server.

⁴ Institute of Museum and Library Services. (2002). Status of Technology and Digitization in the Nation's Museums and Libraries 2002 Report [On-line]. Available: <http://purl.access.gpo.gov/GPO/LPS19451>

⁵ It should be noted that one of the most advanced search interfaces among art museums is the State Hermitage Museum in St. Petersburg, Russia. Any review of the "state of the art" in museum interfaces would be lacking if it did not mention this web site. It is very complicated

played a very large role in determining the features proposed for the Ackland's on-line search interface. Additionally, the findings of the IMLS report were also useful in assessing that the Museum's level of digitization and technology implementation is at least as high as other small museums and with the implementation of an Internet interface to search the collection database, the Museum will be close to the level of technology current in some of the larger museums.

2.2 - Willoughby PHP Interface Configuration

In addition to reviewing other museums' on-line collection interfaces during the field experience at the Ackland, work was also done to configure the PHP script provided by Willoughby so that it would work. Willoughby provides the script free of charge, but does not support the interface because they also have an Internet interface that museums can purchase. The work performed configuring the script was instrumental in the programming phase conducted later in the project because it produced a very simple, but functional search interface.

Under normal circumstances, simply configuring a web page to connect to a database would not warrant mentioning, but in this case, it turned out to be a monumental task and highlights some of the issues facing small museums that do not have a lot of resources available to support the implementation of new technology.

The Ackland Art Museum does not itself maintain either a database server or a web server. The MultiMimsy database is located on a database server in the University of North Carolina at Chapel Hill (UNC-CH) Administrative Information Services (AIS) department and the Museum's web pages are located on a web server in the UNC-CH Academic Technology Networking (ATN) department.

In some respects the Ackland is fortunate to have resources such as AIS and ATN available. Many small museums would either have to run the servers themselves or pay for a private company to host the applications. The disadvantage of this configuration is that when something does not work, determining the source of the problem can be very difficult, as was the case with installing the Willoughby PHP script.

The first step when using an Internet interface to search a database is to get the web pages to establish a connection to the database. In order for the connection to work, the web site needs to know the location and name of the database to which it needs to connect and the username and password to connect with. The PHP script came with an administrative page where this information was to be stored, but even after it was correctly configured, the web pages could not establish a connection to the database.

It took over 80 hours to resolve the problem which, spread out over the course of the field experience, took several months. Part of the problem was that ATN's servers are configured not to show error messages to the user when a PHP script encounters an error, but instead, to log the errors to a text file on ATN's servers. Given that the

and allows users to perform very sophisticated searches, such as searching the database using the percentage of colors composing a work of art. However, the technology is complex beyond anything the Ackland hopes to accomplish and the general search and display features did not include any features beneficial to the Ackland's interface not already addressed by the review.

Ackland's PHP script was running on a production server this made sense, but it made pin-pointing problems very difficult.

The staff at the Ackland were not given access to the text file logging the error messages, presumably because the file contained error messages from every department using ATN's servers, not just the Ackland. Every time tests were run to determine why the PHP script was failing, the Ackland programmer had to call the ATN programmer to ask him to email the Ackland's error messages. If the ATN programmer was unavailable, the Ackland programmer just had to wait.

While this seriously slowed down the process, the real problem was the department where the error was occurring was resistant to believing that was the case. Although the department did eventually fix the problems, the Ackland programmer had to first prove that all the other applications involved with the PHP script were working correctly and that the only possible place the script could be failing was in that department. There were three errors occurring on the server in that department and this process of elimination had to be repeated for each error.

Configuring the Willoughby PHP script was instrumental to the search interface that would be designed during the implementation part of the master's project because the interface would use the same connection as the PHP script and timely completion of the master's project depended on the resolution of the connection problems.

The problems encountered while trying to configure the PHP script demonstrate some of the problems facing small and medium size museums trying to implement Internet interfaces to search their collection databases. This type of project requires someone with skills in web programming, web design and database design, and also requires the necessary hardware and software to run the application. Maintaining both the personnel and the computer equipment is expensive. While a museum may be able to fund the initial project with a grant, this does not address the problems of long term support of the application. This issue will be included in the list of recommendations discussed at the end of the paper, although no solution to the problem has been found.

2.3 – Summary

At the end of the field experience the PHP script was able to connect to the database and was returning search results. The search results pages were not fully functional, but since these pages were not being incorporated into the interface that would be designed during the master's project, this did not impact the project. Configuring the PHP script to connect to the database was beneficial in preparing for the master's project because it provided a working connection that could be used in the master's project interface.

The museum website review conducted as part of the field experience was also instrumental in preparing for the master's project. The review provided a set of current standards in on-line search interfaces that was used to guide the development of the design requirements for the Ackland's on-line search interface. These design requirements are developed in section 3 of this paper.

3 – USER NEEDS ASSESSMENT

The first step in designing the search interface for the Ackland Art Museum was to conduct a user needs assessment to understand the users; what their needs are and their capabilities. The users of the system will consist of two groups, the Ackland's staff and the Ackland's patrons. The patron group consists of two subgroups, the visitors to the physical Museum and the Museum's on-line visitors. The characteristics of the staff were well known, as were some characteristics of the visitors to the physical museum, but no information existed for the Museum's on-line visitors. The goals of the assessment were to learn about the users and how they would use an Internet search interface, and to develop a set of design requirements for both the staff and the patrons. To gather feedback from both the staff and visitor groups, two different methods were used to conduct the user needs assessment. The study was approved by the Academic Affairs Institutional Review Board; following is the description and results of the study.

3.1 - Patrons

With the advent of its web site over five years ago, the Ackland Art Museum now has two distinct groups of patrons, the visitors to the physical museum and the visitors to the virtual museum that currently exists in the form of static web pages. The Museum staff have some basic information about the visitors to the physical museum and their interests. Approximately one quarter of the Museum's patrons are K-12 students and university students who come for guided tours. Three quarters are walk-in visitors who come for exhibitions or special events. The visitors come from within and outside the university and include students, faculty, staff, families with small children, retired people and visitors from other parts of North Carolina, the U.S. and other parts of the world. However, the Ackland has not undertaken a study of its on-line visitors and no information has been gathered from the Museum's physical visitors on their use of and/or interest in the Museum's web site.

The design of the user needs assessment for the Ackland's patrons was structured to gather input from both of these groups. In order to reach the on-line visitors, an instrument was needed that would be easily available to this population, but could also be used with the visitors to the physical museum. To achieve this goal, an Internet based survey was used to gather basic information about the patrons and what features they would like to see in future additions to the Ackland's web site. Using this type of instrument also allowed for a higher number of participants.

The survey consisted of an 11 item questionnaire⁶ administered using the Internet that took the participants approximately 10 minutes to complete. The web pages were written using Active Server Pages (ASP) and the answers were collected in an Access database with no identifying information. A password was used to ensure that only the intended audience was able to complete the survey.

3.1.1 - Methodology

Participants were recruited using two methods with the expectation that an equal number of surveys would be collected using each method to balance the study. The

⁶ Appendix A.

first method consisted of asking visitors to the Ackland Art Museum if they were willing to complete the survey when they entered the Museum. If the visitors consented, they were escorted to a computer set up in the Ackland's main gallery and given oral instructions on how to complete and submit the survey. Due to the presence of the researcher, these participants were able to ask questions when they were unclear about an item on the survey. Half of the museum visitors were surveyed on a weekday and the other half on a weekend to represent the different populations that visit the museum at these times.

The second method involved soliciting participants by email using the Ackland's email list of patrons. This method consisted of an email sent to all the patrons on the email list that explained the purpose of the study and included a link to the instruction page and the password to enter the site. The instructions for completing and submitting the survey were given on an introductory web page and included the contact information for the researcher to assist the participants if they had difficulty completing the survey.⁷ It should be noted that one limitation of this methodology is that the people who have requested to be on the listserv are probably more interested in the affairs of the Museum and may not be representative of the general visitors.

The initial plan was to have 26 subjects participate in the survey, 13 of which would be museum visitors and 13 on-line visitors. Both male and female visitors over the age of 18 were recruited to participate in the survey which was conducted over a two week period, January 9th – 22nd, 2004.

3.1.2 - Results

The response from the patron listserv was quite surprising, with a total of 70 surveys received – more than five times the number expected. Keeping the survey balanced by having an equal number of participants for each method was no longer an option, but the number of participants recruited in the museum was increased from 13 to 20, 10 during the week and 10 on a weekend. There were a total of 90 surveys received from the Ackland's patrons using these two methods.

Unfortunately, due to a programming error, some of the data were not captured. The structure of the questionnaire was that half the questions were the type "select all items in the list that apply" and half were "select only one option". For the questions that were "select all that apply", the answer for each item was either yes or no which was recorded in the database as 1 or 0. For the "select only one item questions", each item in the list had a number assigned to it beginning with 1. For example, question three asked the participants' comfort level with computers. The answers were very comfortable (1), somewhat comfortable (2), somewhat uncomfortable (3), and very uncomfortable (4).

⁷ A few of the survey participants recruited using the patron listserv emailed because they had problems with the password which occurred because it was case sensitive. Only one of the listserv participants emailed that she had technical difficulty; she never received the confirmation message after submitting the survey. None of the listserv participants asked questions about items on the survey, but several of the survey participants recruited in the museum did.

The error arose by copying and pasting the ASP code from question 1, a yes/no type question, and using that pattern for all the questions. For the yes/no questions, the code was a conditional statement: "If 1a=1, insert the value for 1a, else insert 0". This worked for yes/no questions because the only options were 1 or 0. However, this was a problem for questions like number three where the answers ranged from 0 for missing up to 4 for very uncomfortable. For these questions, if the user selected the first option in the list, the answer was recorded correctly because its numeric value was 1, but, if the participant selected any other option, it was recorded as 0.

This error was noticed before the study was completed so a portion of the surveys was recorded correctly. By chance, the number of correct surveys received was 26, the original number anticipated when designing the user needs assessment. Of these 26, 14 were completed by visitors to the museum and 12 by patrons from the Ackland's listserv. For this reason, in the following discussion of the results there are three sets of numbers. For the yes/no (select all items that apply) type questions, there were 90 responses received because these questions were recorded correctly for all the surveys. For the select only one item type questions, there is a "complete" set of data for the 26 surveys recorded correctly and an "incomplete" set for the 64 where only a portion of the data were recorded correctly.

The first set of questions on the survey was designed to gather information about the Ackland patrons that would be helpful in designing an interface for the on-line collection. Table 2 shows the responses for question 1 which asked the participants to tell their affiliation with the Museum. The main item of interest from this question is almost half the respondents, 47%, said they are on-line visitors. While this number is skewed because a disproportionate number of responses came from the Ackland listserv group, it still indicates a clear interest in the Ackland's Internet site; only 2 of the 14 (14%) museum visitors marked "on-line visitor" compared to 40 of the 70 (57%) Internet visitors.

Table 2 - Patron affiliation with the Ackland Art Museum

Infrequent visitor	50 (56%)
Online visitor	42 (47%)
Ackland Art Museum member	37 (41%)
Frequent visitor	34 (38%)
UNC University member (faculty, staff, student, other)	27 (30%)
Other	23 (26%)

Table 3 lists the responses to question two which asked the participants to indicate their status within the museum community. One of the items of interest from this question is the number of art and museum professionals that are potential users for the interface (visual artists, art historians, collectors or museum professionals). Twenty-nine percent (29%) of the survey respondents indicated they are both an art or museum professional and an on-line visitor. This has implications for the design because these users might be more interested in known item searches versus general browsing and also may need an option for an advanced search as well as a simple keyword search.

A second item of interest from question two is the low number of participants who indicated they are educators. One possible use for an on-line collection is by teachers

for classroom assignments, but the responses on this survey indicated that, at least initially, there is little interest with this interface for instructional purposes.

Table 3 - Museum community status

General public	62 (69%)
Retired	30 (33%)
Visual artist	26 (29%)
Collector	20 (22%)
Art historian	17 (19%)
Independent scholar	13 (14%)
Student	13 (14%)
Museum professional	12 (13%)
University faculty	11 (12%)
Other	9 (10%)
K-12 teacher	6 (7%)

The results from question three which asked participants about their educational background are summarized in Table 4. This question and also questions four, five, six and eight are missing some data due to the error described earlier. For question three, none of the participants indicated they have less than a high school degree, so basic literacy is not likely to be a primary issue in designing the interface for the Ackland's on-line collection. For the 26 complete responses, 88% have a bachelor's degree or higher indicating that a significant portion of the user population for this interface is well educated.

Table 4 - Educational status

	TOTAL	COMPLETE	INCOMPLETE
Less than a high school diploma	0 (0%)	0 (0%)	0 (0%)
High school graduate, no college		1 (4%)	-
Some college or associates degree		2 (8%)	-
Bachelors degree or higher		23 (88%)	-
<i>Missing</i>		0 (0%)	64 (100%)

Table 5 summarizes the participants' comfort level using computers. All of the responses for the item "very comfortable" were recorded correctly because its numeric value is 1. Seventy percent (70%) of all participants are very comfortable using computers. For the 26 complete surveys, only 1 person marked "somewhat uncomfortable" and no one indicated "very uncomfortable". Based on these responses, the user population for the Museum has experience using computers so basic computer competency will also not be a primary issue in designing the interface.

Table 5 - Level of comfort using computers

	TOTAL	COMPLETE	INCOMPLETE
Very comfortable	62 (69%)	14 (54%)	48 (75%)
Somewhat comfortable		10 (38%)	-
Somewhat uncomfortable		1 (4%)	-
Very uncomfortable		0 (0%)	-
<i>Missing</i>		1 (4%)	16 (25%)

Questions five and six were aimed at learning what types of Internet connections would be used to access the Museum website. For question five the results are dependent on

the 26 surveys that were recorded correctly which indicate that 73% of the participants are connecting from home. Additionally we know that only 6% of the total respondents are connecting from school.

Table 6 - Most frequent Internet use location

	TOTAL	COMPLETE	INCOMPLETE
School	5 (6%)	3 (12%)	2 (3%)
Library		1 (4%)	-
Work		3 (12%)	-
Home		19 (73%)	-
Other		0 (0%)	-
<i>Missing</i>		0 (0%)	62 (97%)

The participants who are connecting from home were asked what type of connection they are using. The answer "dial-up modem" was correctly recorded for all respondents and indicates that 38% of the participants have this type of connection. For the 26 complete responses, 42% have dial-up and 42% have high speed. The results from questions five and six, summarized in Table 6 and Table 7, indicate that most users would connect from home and that slow connection speeds will be a primary concern in designing the interface. As this is an interface for an image database, serious consideration needs to be given to the sizes of images available on the web site.

Table 7 - Connection speed from home

	TOTAL	COMPLETE	INCOMPLETE
Dial-up modem	34 (38%)	11 (42%)	23 (36%)
High speed cable/DSL		11 (42%)	-
Not sure		2 (8%)	-
<i>Missing</i>		2 (8%)	41 (64%)

Question seven asked participants how they prefer to search for information on the Internet. This is of primary importance to this project because it has direct implications for the features that are incorporated in the interface. The question asked whether the users prefer to search or browse for information when using the Internet and if they are searching, whether they prefer keyword searches or a standardized list of items in a drop down box. Keyword searching was used by 89% of the survey respondents and indicates a clear preference for this functionality. That only 34% of the respondents use drop down lists also has implications because this type of functionality is planned for incorporation into the interface during Part 5 of the master's project to provide users with lists of keywords. Such a low percentage may indicate that users are not familiar with drop downs lists and may need to be educated on how to use them, or more likely that the participants were simply unfamiliar with the terminology "drop down list".

Table 8 - Internet Search preferences

Search using your own words (i.e. Google like search)	80 (89%)
Browse list of hyperlinks (i.e. Yahoo like search)	35 (39%)
Search by selecting from a list of terms (i.e. Drop down lists)	31 (34%)
Do not currently use the Internet to search for information	1 (1%)

Question eight is also of particular interest to this project since it asked participants if they would use the on-line database to search the collection if it were made available. Reassuringly, 73% of the total respondents indicate they would. The answers “no” and “not sure” are missing for 18 of the respondents, but the “Complete” data set indicates that most of participants who did not say yes were undecided indicating they were not unwilling to use the system, just uncertain. Overall, the responses indicate strong interest in using an on-line search interface should it exist.

Table 9 - Interest in using Ackland collection database on-line

	TOTAL	COMPLETE	INCOMPLETE
Yes	66 (73%)	20 (77%)	46 (72%)
No		2 (8%)	-
Not sure		3 (12%)	-
<i>Missing</i>		1 (4%)	18 (28%)

To obtain some information about how the interface will be used, the participants were asked what features they would like to see incorporated into the interface. Despite the fact that only 39% of the respondents said they prefer to browse the Internet in question seven, 76% of the participants would use the interface for general browsing. This has interesting implications because the Ackland collection database does not use a controlled vocabulary which is needed to create the categories available in the browse feature. This issue will be addressed in section 4 of this paper.

Table 10 - On-line collection usage

General browsing	68 (76%)
Preparation for a visit	53 (59%)
Image acquisition	35 (39%)
Research: Discovery	33 (37%)
Research: Fact Checking	33 (37%)
Classroom material/lesson plan (teachers)	21 (23%)
Classroom material/assignment (students)	7 (6%)
Other	7 (6%)

Surprisingly, 59% said they would use the collection to prepare for a visit. At the time of the survey, it was thought the Ackland did not have enough staff to keep an accurate record in the database of what is on display, which could cause consternation for a visitor who finds something on-line they want to see, only to arrive at the Ackland and find it is in storage or out of the museum for some reason. During the usability test conducted at the end of the project it was determined the database does contain this information and it is available for use on the Interface.

Thirty-nine percent (39%) of the respondents indicated they would use the collection for image acquisition which is an issue that will need to be addressed by the Ackland staff due to copyright issues.

Thirty-three (33%) of the participants indicated they would use the collection for research discovery and fact checking. This re-iterates the finding in question two that the interface will need to support professional uses of the data base as well as general browsing.

Another reason the results from this question are interesting is because they also support the findings in question two that the on-line collection is not currently being used to support educational or instructional uses of the collection. The Ackland has a strong program with local schools, so this is something that bears future investigation by the Ackland staff, although it will be outside the scope of this project. Table 10 contains the results for this question.

The final question on the survey asked the participants about features they would like to see incorporated in future additions to the Ackland web site. The items in the list are outside the scope of this project, but the results can be viewed in Table 11.

Table 11 - Future additions to the Ackland collection on-line

High resolution images	68 (76%)
360 degree view of objects	64 (71%)
Zoom capability	62 (69%)
Videos of gallery walk-thrus, lectures, etc.	55 (61%)
Side-by-side image comparison	55 (61%)
Links to related materials such as catalog entries	55 (61%)
Sound clips of music, gallery talks, lectures, etc.	51 (57%)
Ability to save searches	37 (41%)
Other	7 (8%)

In addition to the items in question ten, patrons were given the opportunity to provide comments at the end of the survey. Some of the more interesting suggestions included allowing visitors to add reviews of the objects, searches by artistic movement or content theme and indicating if the object is on display. As with the items in question ten, these suggestions are outside the scope of this project, but will be included in the list of future recommendations.⁸

One final and surprising development that arose from the email sent to the Ackland's patron listserv was an invitation to interview a patron. The patron is a collector and a self-described connoisseur of museum web sites and he volunteered his expertise to provide a user's prospective of some museum website features that are desirable and many that are not.

The interview lasted for two hours in which a number of museum websites were visited. Most of the patron's concerns were familiar, but he did point out that very few museum websites include a printer friendly format and he was particularly frustrated by having the descriptive information for an object on the page with the thumbnail image and little or no descriptive information on the page with the enlarged image. In the cases where it does not violate copyright restrictions, a link to a printer friendly format would be a nice addition.

The patron also liked having links to other works of art by the same artist, for both the museum collection he was currently searching and other museums as well. Additionally, he liked having references to the artists, mediums, cultures and techniques related to the object. At the present time, this information is not available for the objects in the

⁸ Appendix B contains the description of the survey results including the text answers for responses to "Other" on questions one, two, five and ten, and the comments from question 11.

Ackland's database, but the possibility of including some static links or even a reference page to sites that could provide this information should be considered.

The interview also afforded the opportunity to show the patron some features on other museums' websites that were being considered for inclusion on the Ackland's interface. This included a discussion on how search results are displayed and the possibility of giving the user control over the display format.

The final interesting item that came from the interview was the patron's confusion over static web pages versus dynamic pages generated by searching a database. Like anyone who uses the Internet, the patron was frustrated by pages that are there one day and gone the next. Museums seem to feel it necessary to change their websites on a frequent basis, just as they change the exhibits in their physical museums. In some ways the patron's concern is outside the scope of this project because it does not address the existing static pages for the Ackland's web site, however, the conversation produced the interesting suggestion of linking archived static pages from old exhibits to related objects in the database.

3.2 - Staff

The user needs assessment conducted with the Ackland patrons was intended to provide information about the characteristics of the people who would be using the interface and the types of tasks they would use it to perform. The user needs assessment conducted with the staff had different objectives and employed a different methodology. The first objective was to learn how museum professionals use on-line image collections and the second was to determine the features they would prefer to have included in the Ackland's interface.

3.2.1 - Methodology

In their book, *Contextual Design Defining Customer-Center Systems*⁹, Beyer and Holtzblatt recommend the use of "contextual interviews" to gather design requirements during the systems analysis phase of a project. A typical contextual interview consists of an analyst observing a client while he/she performs work related tasks over the period of time deemed appropriate by the design staff. The purpose is to allow system designers to see the work the client is performing and the context in which it is performed without having to rely solely on the client's description. Conducting this type of interview with the Ackland staff was ruled out as an appropriate methodology for this study because it would not have collected the necessary information. To adequately answer the questions being address in the study, it was important to observe the staff using an on-line collection. This is not a task which the staff performs on a regular enough basis for it to be observed in a traditional contextual interview. A generic interview where individual staff members were asked their opinions about museum search interfaces was also deemed insufficient because the tools that users think will be helpful in theory may not be in practice.

⁹ Beyer, Hugh, and Karen Holtzblatt. "Principles of Contextual Inquiry." *Contextual Design. Defining Customer-Centered Systems*. San Francisco: Morgan Kaufmann Publishers, Inc., 1998. 41-66.

The methodology employed was a cross between a contextual interview and a usability study. The participants were given a series of tasks to perform using two existing on-line museum search interfaces and asked to complete questionnaires evaluating each of the interfaces. Following are descriptions of the two web sites that were used in the contextual interviews and explanations for why each was selected.

The two museums used were the Peabody Museum of Archaeology and Ethnography at Harvard University (<http://www.peabody.harvard.edu/col/default.cfm>) and the Tate Museum in London (<http://www.tate.org.uk/servlet/QuickSearch>). The Peabody site is very clean and simple and does not contain a lot of text, links or graphics. The Tate, on the other hand, has a very complicated interface with numerous colors, links and animated images scrolling at the top of the screen. Both sites provide links to navigate the site, but the links are placed in different locations on the page and have different labels.

Both sites provide users the option to browse the collection or search it using either a simple or an advanced search. The advanced search form on the Peabody site allows users the option to use Boolean operators whereas the Tate does not. Additionally, both sites provide lists of the items in the database, such as a list of artist names to aid users in becoming familiar with the collection and performing keyword searches. Again, the techniques used to implement these aids are different on each site.

The last element of interest in the comparison is the labels used by each site. The Peabody site uses the terms "who, what, and where" instead of the terms "artist, medium and culture" used by the Tate and most other museums¹⁰. Also, both sites have some variation in how they refer to the browse and advanced search features. The Peabody uses the widely accepted terms "browse" and "simple search", but places the advanced search under the label "Researcher Options." The Tate calls its browse feature "Subject Search" and its advanced search "Full Search." Like the Peabody, the Tate employs the term "simple search" for that feature.

The methodology used to conduct the staff interviews was designed to compare the differences in these two interfaces to determine which features the Ackland staff found preferable and regardless of preference, which ones seemed to work best, which is not always the same thing. Additionally, the methodology was designed to provide insight on how relatively experienced users interact with an image database by allowing the researcher to observe the staff as they completed the tasks.

The interviews were designed to take approximately thirty minutes and were conducted in the offices of the individual staff members. Any differences in hardware that may have existed among the participants applied equally to each website; no bias due to performance problems was observed during the interviews.

The seven participants in the interviews were selected in consultation with the Ackland's assistant director. The selection of these staff was based on their status as primary stakeholders in the new system. The participants consisted of the Director of the Ackland Art Museum, the Director of Communications, two of the Ackland's educators,

¹⁰ This statement is based on the review of museum websites discussed in Part II of this paper.

the Collections Curator, the Registrar and the Assistant Registrar¹¹. The Exhibitions curator was unavailable to participate.

At the beginning of the interviews, participants were asked to complete the Staff Technology Use Survey¹² regarding their familiarity with computers, the Internet and on-line image databases. After completing the technology use survey, the purpose and structure of the interview was explained to the participants who were then given the written instructions on what they were expected to do. The written instructions included the tasks comprising the Museum Interface Comparison Exercise¹³. After reading the instructions, the participants were asked to perform the series of tasks for each website. Half of the participants started with the Tate interface and half started with the Peabody interface. After the final tasks for each museum interface were completed, the participant was asked to complete the Museum Interface Evaluation Survey¹⁴, an 18 item survey used to evaluate each site. Both the tasks the participants were asked to perform and the evaluation surveys varied slightly due to differences in the interfaces, but the tasks were designed to compare similar features on each site.

While completing the tasks in the exercise, the participants were asked to speak aloud to aid the investigator in understanding their actions and re-actions. In addition to observing the participants, the investigator also took notes on the participants' comments and actions.

3.2.2 - Description of Instruments

Following is a description of the Staff Technology Use Survey, the description and explanation of the tasks used in the Museum Interface Comparison Exercise and the description of the Museum Interface Evaluation Surveys.

The Staff Technology Use Survey was primarily used to determine if any of the staff had significantly less experience using computers, searching the Internet for information or using on-line image databases. The secondary purpose for the survey was to ask participants how they prefer to search for information on the Internet and to ascertain their motivations for previous use of image databases.

The Museum Interface Comparison Exercise was divided into three parts: Part A consisted of the first two tasks the users were asked to perform for both sites which included an unstructured and a structured activity for each interface. Part B introduced the evaluation survey instrument for the first interface, had the user perform an additional series of structured tasks for the site, and then evaluate the site using the survey. Part C concluded the exercise by having the participant read the evaluation survey instrument for the second interface, complete the structured tasks for that site, and complete evaluation survey for it. The basic methodology of the usability interviews was borrowed from a research study conducted at UC Berkeley aimed at designing an

¹¹ The Registrar and Assistant Registrar are responsible for the administration of the collection which includes maintaining the collection database.

¹² Appendix C.

¹³ Appendix D.

¹⁴ Appendix E.

image database interface using structured metadata. However, the methodology used here was significantly modified to support the purposes of this study.¹⁵

Part of the reason for structuring the interview in this way was to allow the participants to become familiar with both sites and form their own impressions using the unstructured activity in Part A without being biased by reading the evaluation surveys in Parts B & C. The unstructured activity in Part A also allowed the observer to see how the museum professionals would use the interfaces when left to their own devices.

The tasks in parts B and C were designed to ensure that participants would use all the features they were being asked to evaluate. The participants were asked to return to the first interface after completing part A to remind them what it looked like. They were asked to read the evaluation questionnaire before completing the tasks in parts B and C so that they would know what questions they were going to be asked; this also helped the participants understand why they were being asked to perform such specific tasks.

Finally, the overall structure allowed the participants to evaluate the merits of each interface individually and to compare the similar features between each interface to indicate which ones they preferred.

3.2.3 - Purpose of Tasks

The first task the participants were asked to complete with each interface was to search for images of interest. This allowed the participants to become familiar with the interface and allowed the researcher to observe which features the participants chose to use when given an option, how well they navigated the site and what features caused confusion. It also allowed the participants to become comfortable with being observed without the added pressure of having to complete the tasks "correctly."

The second task was designed to steer the participants toward the advanced search features, but the instructions did not indicate this. The easiest way to complete the second task was to use the advanced search, which allowed the participants to be observed to see if they would use this feature, and if so, any problems they encountered in doing so.

It should be noted that the second task for each interface asked the participants to perform searches that were not possible given the design of the interfaces. The original structure of this task was not to point out the shortcomings of each site, but to encourage the participants to use the Boolean operator "OR" on the Peabody interface.

This task for the Peabody Museum asked users to find all masks and carvings by the maker Buzi. If the participants used the "AND" operator, no results were returned because there were no records in the Peabody database for carved masks made by the Buzi tribe. However, if the participants used the "OR" operator, the database returned

¹⁵ A description of Berkeley's tasks and methodology can be found under the section heading: "Usability Study" at this citation:

Yee, K., et al. (2003). Faceted Metadata for Image Search and Browsing. Proceedings of the conference on Human factors in computing systems [On-line], 401-408. Available: <http://bailando.sims.berkeley.edu/papers/flamenco-chi03.pdf>

all records for masks and carvings in the database regardless of who made them. Determining whether experienced museum professionals understood how to use Boolean operators was considered a necessary question for this project because it represented one of the design options when creating the advanced search feature. Structuring the task in this way was necessary to gather this information.

Initially, the comparable task designed for the Tate Museum only asked the participants to find all the works of art by the artist Gabo with the medium type "sculpture". This task was devised so that it could only be completed by using the advanced search since the simple search only provided fields for artist and title of work, but not medium. After testing the tasks with two participants, it was realized that the Peabody interface was being perceived as inferior to the Tate interface because users could complete the second task for the Tate, but not for the Peabody. To correct for this, the second task for the Tate interface was changed to ask the participants to perform a task that also could not be completed given the design of the advance search. Specifically, the task required searching for two mediums when the interface only allowed the user to search for one medium at a time.

Changing the second task in this way added a secondary use for the task by pointing out the short comings for the advanced search features on each site. Namely, the Peabody provided a great deal more flexibility, but the Boolean operators were confusing and either returned to many results or none at all. The Tate was much easier to use, but imposed serious limitations on the searches it could be used to perform which is problematic given that it is the tool designed for performing advanced searches.

After completing Part A, participants were asked to complete a series of short tasks in Parts B and C to ensure they saw all the features on both interfaces they were being asked to evaluate. For both B and C, Tasks 1 and 2 directed the participants to the appropriate interface and asked them to read the Museum Interface Evaluation Survey. Task 3 asked the participants to use the browse feature to search for images of interest so that they would be familiar with this feature and also with the information and layout of the search Results page. Task 4 asked the participant to view the details for an item found using the browse feature. This ensured the participants saw the information and layout of the Details page for a specific object. Performing Task 4 placed the users several pages removed from the search page. This set up Tasks 5 and 6 which asked the participants to return to the search results page and then begin a new search. These tasks gave the participants the opportunity to become familiar with the navigation provided on the interfaces. Task 7 and 8 for the Peabody interface and Task 7 for the Tate were designed to have the participants use the Simple search feature and also become familiar with some of the keyword aids on the sites. Finally, Task 9 for the Peabody and Task 8 for the Tate asked the participants to complete the Museum Interface Evaluation Survey for the respective interfaces.

The Museum Interface Evaluation Survey consisted of sixteen Likert scale questions and two short answer questions. For the Likert scale questions, participants used a seven point Likert scale to evaluate the features of the sites they used in the Museum Interface Comparison Exercise and to rate the interfaces as a whole. A seven point Likert scale was used because in addition to evaluating the individual features of each

interface, the participants were also comparing the similar features of the interfaces. The seven point scale allowed the participants to make more subtle distinctions to assist them in the comparison.

The short answer questions were used to gather additional comments from the participants about the interfaces. The first short answer question asked about the navigation, labels and overall design of the site, the second question asked about the browse, simple search and advanced search features.

3.2.4 - Results

The results¹⁶ from the Staff Technology Use Survey were not very surprising. Of the seven participants, four selected "very comfortable" with computers and three selected "somewhat comfortable". Observing the participants as they completed the museum interface comparison activity, all the participants demonstrated proficiency in using computers.

All the staff preferred keyword searches to look for information on the Internet rather than browsing and all had previously used the Internet to search an image database. Five of the staff had used an image database for general interest and all seven had used one in the course of doing their work. Additionally, two of the staff had used an image database for school assignments.

All seven of the staff had used an image database to look for a specific object and five had just been browsing. Six staff had been using an image database that was part of a museum collection.

The conclusions drawn from the survey were all the staff had similar experience using computers, the Internet and image databases and no adjustments were needed when analyzing the results from the Museum Interface Evaluation Survey. Additionally, the Ackland staff preferred simple keyword searches over browsing.

The results from the Museum Interface Evaluation Survey¹⁷ were interesting, but not always as easy to interpret. The questions on the survey asked about navigation, labels, search features, and overall design of search pages. In the following discussion, the result tables show the responses for the Peabody interface in the first row and the Tate in the second. The numbers in the columns beside the museum name show the distribution of answers for each museum. The abbreviation "SD" is for strongly disagree, "N" is for neither and "SA" is for strongly agree. The responses for "neither" were removed to show the positive and negative trends more clearly.

All questions had seven responses with the exception of questions 3 and 4 for the Tate interface and question 4 on the Peabody interface. For question 4 on the Peabody interface, one participant marked two boxes, so this response was disqualified, leaving six valid answers for this question. For both questions 3 and 4 on the Tate interface, a

¹⁶ Appendix F.

¹⁷ Appendix G.

participant failed to give a response, thus leaving only six valid responses for each of those questions.

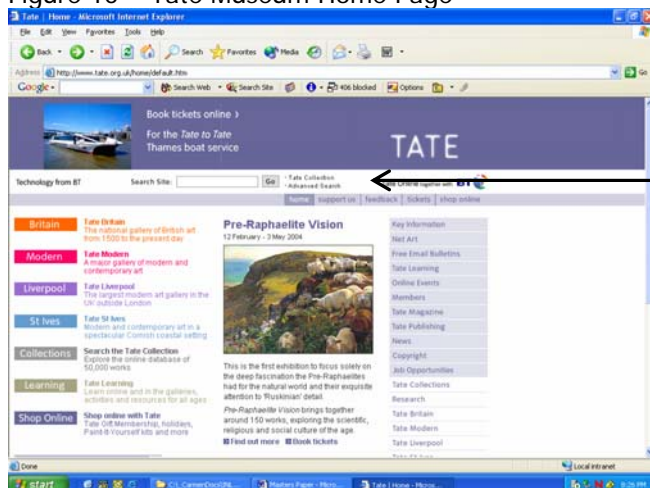
Some of the questions included in the survey derived from the earlier work done reviewing museum interfaces. During the review, both elements that appeared to be problems on other interfaces and elements that seemed to be interesting solutions to problems were identified. These possible problems and solutions were incorporated into the tasks in the interface comparison exercise to test their impact with real interface users.

The first question, "It was easy to find the search pages from the museum home page", fell into the problem category. Many museums provide a search feature on the home page that searches the entire museum website and a separate feature to search the collection database. The second search is usually located under the "Collections" link and is not visible on the home page. This configuration makes sense once a user become familiar with it, but it is not at all intuitive.

This is a problem for several reasons. First, many museums do not have an Internet accessible database so if users end up in the website search, it is possible that they will assume the museum does not provide the functionality to search the collection database and leave the site disappointed. Additionally, many museums now have small sections of their collection available on static pages which presents another problematic scenario where the user finds a few images using the website search, thinks that is all that is available and again leaves the site disappointed.

Both the Peabody Museum and the Tate Museum use confusing terminology on their home pages. To illustrate the problem, Figure 10 shows the Tate Museum's home page. The black arrow is pointing to the form field to search the museum website. Immediately to the right of the "Go" button used to perform the search are two small text hyperlinks labeled "Tate Collection" and "Advanced Search". The advanced search link is part of the search of the entire museum website, but the link above it goes to the section of the web site where users can search the collection database. Putting the link "Tate Collection" next to the box to search the website is very confusing and misled more than one of the Ackland's staff.

Figure 10 – Tate Museum Home Page



The staff were purposely given the link to the museums' home pages to see if they had trouble finding the search pages. Without fail, they did, and in some cases, did not even realize they were in the wrong place. The results on the survey do not really reflect this, possibly because some of the staff repeated the steps while moving from Part A to Parts B and C in the exercise. One of the staff even commented it was confusing at first, but was clear the second time; she gave both museums high marks.

Table 12 - Ease of finding search page from home page

	SD			N			SA
Peabody		1	1		3	2	
Tate			2		3	2	

The results from the first question present an interesting design challenge. Considering the trouble the Ackland staff had finding the collection search pages, it is clear that the museum home pages need to do a better job of indicating when their collection database is available on-line and how to get to it. However, it should be noted that for any of the Ackland staff who did repeat the steps to get to the collection search pages, they had little or no trouble doing so the second time. These results show this is primarily a problem for first time users which should be taken into consideration when designing the interface according to the authors of the book *Software for Use: A Practical Guide to the Models and Methods of Usage-Centered Design*.¹⁸

The authors, Constantine and Lockwood, discuss the tension between designing interfaces for beginners and designing for intermediate and experienced users. These groups have different needs which should be addressed when designing the interface. It is also important when designing an interface to know if the system will continually be supporting lots of new users or if the user group is fairly stable so that once the group is past the initial learning stage, there will not be many new users to the system.

Once this characteristic of the user group is known, the interface can be designed to support the learning needs of the group. Based on the data gathered in the Ackland patrons' user needs assessment, 56% of the users are infrequent visitors and 38% are frequent visitors. The infrequent visitors can be probably expected to remain novice users, while the frequent visitors and the Ackland staff will be probably be intermediate or expert users. In the case of the Ackland, the interface to search the on-line collection will need to support the whole learning continuum.

Another major shortcoming of many museum search pages is the poor navigation that is provided. The Peabody site actually had a good navigation system; it was just placed in a bad location. The links to begin a new search, return to the search results, or move between the results page and the detail page were at the bottom of the screen. Once participants found the links, they generally used them, but they almost all commented that the links needed to be moved to the top of the page.

¹⁸ Constantine, L. L., and L. A. D. Lockwood. "Once a beginner: supporting evolving usage patterns." *Software for Use: A Practical Guide to the Models and Methods of Usage-Centered Design*. New York: ACM Press, 1999. 265-295.

The Tate interface had the navigation links in a good location; they just were not easy to notice. The Tate museum uses a color scheme to separate different sections of their website and the collection search pages use a pale gray. As part of this color scheme, the navigation links are in really small gray text and although they are in a very visible location, many of the staff did not see them and never used them.

Table 13 - Ease of navigation using the links provided

	SD			N			SA
Peabody		1	1		2	2	
Tate		1			1	4	1

Table 14 - Ease of beginning new search using links provided

	SD			N			SA
Peabody			2		4		1
Tate			1		1	4	

The results shown in Tables 13 and 14 indicate the staff preferred the Tate's navigation to the Peabody's. This finding is interesting considering half of the staff never even noticed the navigation links on the Tate interface. One possible explanation for this finding is for the staff that found the links on the Tate, they liked them, for the other half, they found workarounds – without realizing they were workarounds – and did not ever use the navigation system. Since this half of the staff did not notice the navigation links, they were evaluating the workarounds. For the Peabody interface, all of the staff eventually found the navigation links on their sight, so they all noticed their location was a problem and graded the site accordingly.

A less thoughtful response to this hypothesis would be to say the moral of this finding is to put the links at the top of the page using a font that is neither too tiny nor too pale to see on the screen. A more serious response is to consider providing a primary navigation system and a good backup system because no matter how well placed the primary system is, some users will always over look it.

The final question about the design of the sight asked the participants their overall impression of the layout of the pages, the text and graphics. The Peabody site uses a light beige color with burgundy text and is very simple. It does not contain a lot of text or images and no animation. The Tate is light gray, has many links and has images scrolling at the top right of the screen. When asked their preference, the staff leaned slightly more towards the Peabody as shown in Table 15.

Table 15 - Overall, the layout of the pages, the text and graphics was pleasing

	SD			N			SA
Peabody			1			3	1
Tate		1	2			2	1

The lack of strong preference for the Peabody was somewhat surprising as many of the staff commented on how gray and crowded the Tate sight was and several commented on how much they did not like the scrolling images on the Tate. It was unclear if the results were saying the staff did not like the Peabody interface anymore than the Tate,

or if their overall preference for the Tate (discussed below) biased the results of this question. This was an issue that received further investigation with the prototypes for the Ackland interface that are presented in the section 4 of this paper.

The Peabody's labels for some of their database fields also needed investigation. This museum uses "who, what, where" instead of artist name, title of work, object type or medium". During the review of other museum websites, the only other museum that used this scheme was the British Museum. The Tate uses the more traditional labels. The difference in labeling schemes between the Tate and Peabody allowed for a comparison of the labels to see if the participants experienced difficulty in using the less familiar "who, what, where".

Table 16 - Clarity of the labels "who/what/where" vs "artist name, work title, object type"

	SD			N			SA
Peabody		1			2	1	2
Tate					1	4	2

During the interviews, the staff did not seem to experience major difficulties with the Peabody labels, but as the results in Table 16 show, the staff preferred the traditional labels.

An additional item of interest that arose during the interviews that was not addressed on the evaluation survey was the confusion over the titles used by the Tate for the browse and advanced search features and by the Peabody for their advanced search feature. The Tate used Subject Search and Full Search and the Peabody used Researcher Options. The staff found these terms confusing and when completing the survey questions related to these features, they had to keep referring back to the websites to figure out which was which.

In general, it seemed that changing the language for items that have well established titles was confusing for the users and should be avoided unless there is a strong need to change it. This view is supported by Rosenfeld and Morville in their book *Information Architecture for the World Wide Web*. They recommend for labeling systems that already exist, such as the one for navigating websites, it is best to pick a system the users are familiar with and apply it consistently across all the pages in the site.¹⁹

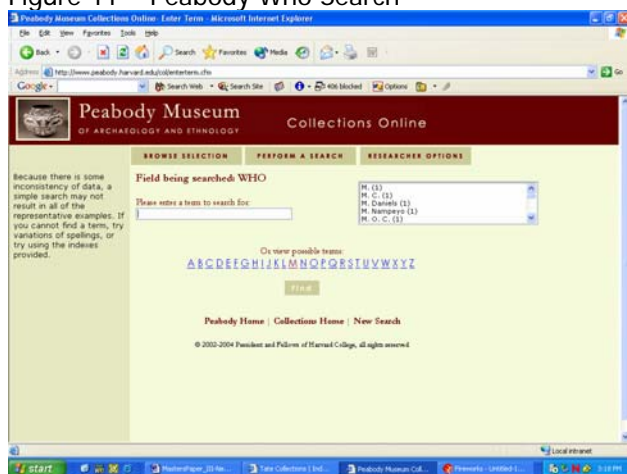
The next item on the evaluation surveys addressed the different features the two museums used to assist users in becoming familiar with the collections. Like any other database, becoming familiar with the terminology in a museum's collection database is crucial to being able to use it. Some museum search interfaces do not provide the users with keywords, but more and more museums seem to be addressing this problem. Based on the review of museum websites in section 1, there does not seem to be a standard means of doing this at present. Given the lack of standardization, it was

¹⁹ Rosenfeld, Louis, and Peter Morville. "Labeling Systems." *Information Architecture for the World Wide Web*. USA: O'Reilly & Associates, 2002. 86-87.

important to research the usefulness of the keyword help features provided by both sites.

For the Peabody, in addition to the lists of items found in the museum's browse feature, the interface also provided keywords on the simple search forms. The Peabody's simple search included separate pages for searching the Who, What and Where fields. Each page contained a list of the letters in the alphabet that were hyperlinks to keywords beginning with that letter for the specified field in the database. The keywords appeared in a box in the upper right part of the screen. Users could click on a keyword and through the use of a JavaScript function, the keyword was inserted into the form field for the user. Figure 11 shows the Peabody's simple search page for searching the Who field.

Figure 11 – Peabody Who Search



The Tate provided a list of artist names and their dates under the tab "Artist List". Because the Tate collection has far too many artists to list on one page, the Tate also employed the "alphabet list" of hyperlinks across the top of the page. Going down the page, the alphabet is listed again and beside each letter is hyperlinked text indicating the range of artists for that letter. For example, "A: Abbey to Ayrton" and "B: Bacon to Buvelot". Figure 12 shows the Tate's Artist Name keyword list.

Figure 12 – Tate Artist Name Keyword List



The staff were asked if they found each of these sites' keyword lists helpful in becoming familiar with the collection. The results indicate that two thirds of the users found the keyword lists helpful and of this group, there was a preference for the Tate.

Table 17 - Helpfulness of keyword lists

	SD			N		SA
Peabody		1	1		1	3
Tate			2		1	3

One thing that might account for the Peabody's low ratings is that two of the staff received errors when trying to use the JavaScript function in older versions of Netscape. For purposes of designing the Ackland's interface, both the JavaScript problem and the apparent preference for the Tate's implementation of the keyword lists were explored further in the design phase of the project.

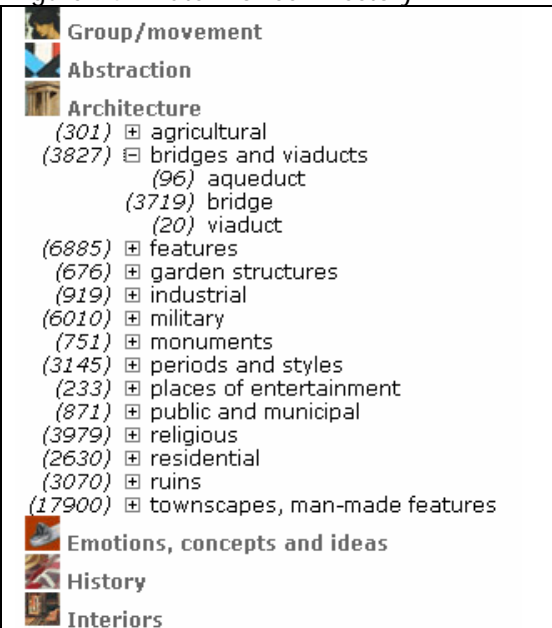
The staff were also asked to evaluate the usefulness of the browse features in becoming familiar with the collection. Again, the staff seemed to prefer the Tate's feature to the Peabody's.

Part of the reason for this is probably due to the confusion many of the staff experienced when using the Peabody's browse feature which uses a drop down list to provide the categories for the items in the collection. As shown in Figure 13, the organizational structure for the Peabody list is geographic area, but this is not obvious because the designers used abbreviations such as "AF" for African and "AS" for Asian. The items in the list were alphabetized by geographic area and then by medium. This meant if participants wanted to view masks, they could not go to "M" in the list, but had to pick a geographic region and then find the masks for that area. Several of the staff could not figure out the structure of the list and it had to be explained to them.

Figure 13 – Peabody Browse Drop Down List



Figure 14 – Tate Browse Directory



The Tate's browse feature is implemented differently as shown in Figure 14. Instead of a drop list, they use a mechanism that works like the file directory tree in Microsoft Windows Explorer. The first page lists very broad categories with a "+" in front of them. The user expands the categories till they finally reach the last leaf in that branch. Clicking on this leaf produces the result page for the objects in the selected category. When faced with this design, many of the staff did not understand they were supposed to click on the items to drill down. However, once it was explained to them, they were fascinated with the categories. The classification system used here made sense to them where the Peabody's did not, which may explain the higher ratings for the Tate.

Table 18 - Usefulness of browse categories in becoming familiar with the collection

	SD		N		SA	
Peabody	1	2			1	2
Tate			1		2	2

Additional information was gathered on this feature during the interview by observing the staff try to use both features. The Peabody site was simple because it used a drop down list which all the users were familiar with. They did not understand the categories in the list, but they knew how to make the functionality work. The hierarchical structure on the Tate site however presented much more of a problem. Some of the staff commented that the page should include instructions explaining how to use the feature. The problems the staff encountered while using these features were taken into consideration when designing the Ackland's interface.

The next three questions on the survey asked how successful the searches were using each of the features browse, simple search and advanced search. The Tate's features were preferred in every category. The staff's preference for the browse feature was discussed above, so only the simple and advanced searches are addressed here.

Table 19 - Searches were successful using the browse feature

	SD		N		SA	
Peabody			1		3	1
Tate					1	1

Not surprisingly, the Tate and the Peabody implemented their search features differently. The Peabody's simple search only allowed the user to search one database field at a time such as the Who search shown in Figure 11. The Tate allowed the user to search the artist name and title field at the same time. The staff's preference for the Tate site is marginal and there were no comments made either during the exercise or in the comments section of the survey to account for it.

Table 20 - Searches were successful using simple search

	SD		N		SA	
Peabody					2	2
Tate					1	3

However, the results for the advanced search shown below in Tables 21 and 22 are easy to explain. The Peabody provided a great deal of flexibility, but also used Boolean operators. The Tate was easy to use, but provided little flexibility. Both from their answers on the survey and comments made during the exercise, the staff were clear that they want the flexibility of the Peabody and the simplicity of the Tate, but they disliked the Boolean operators as shown in Table 22.

Later in this project, the staff will be presented with several different options for the browse, simple search and advanced search features to arrive at a more definitive answer regarding their preference for how each of these features should work.

Table 21 - Searches were successful using advanced search

	SD			N			SA
Peabody	1	2	1		1	1	1
Tate		1	1			3	1

Table 22 - [Peabody] Boolean operators were helpful in narrowing searches
[Tate] Advanced search provided adequate flexibility

	SD			N			SA
Peabody	2	2				1	
Tate		3				3	

The results shown below in Table 23 are also explained by the problems the participants had using the Boolean operators on the Peabody's advanced search. The few instances where the staff received empty result sets was while trying to perform the task to retrieve only masks and carvings made by the Buzi tribe, the task that required the use of the Boolean operators. As the staff did not encounter many empty result sets, the question was not particularly useful in evaluating one search method over another as it was intended to do.

Table 23 - Number of times searches returned 0 results was limited

	SD			N			SA
Peabody	1	1	2			2	1
Tate					1	4	1

The findings in Tables 24, 25, and 26 are interesting when compared to the results in Tables 9, 10 and 11 which asked if the searches for each of these features were successful. In 9, 10 and 11, the staff indicated a preference for the Tate each time, but here it is slightly different. The staff still prefer the Tate's browse feature, but clearly prefer the Peabody's simple search and are pretty evenly split on the Advanced feature. These results will also be explored further in the prototype section of the project.

Table 24 - For future searches I would use the browse feature again

	SD			N			SA
Peabody	1	1			1	1	3
Tate					3	1	3

Table 25 - For future searches I would use the simple search feature again

	SD			N			SA
Peabody						2	5
Tate					2	2	3

Table 26 - For future searches I would use the advanced search feature again

	SD			N			SA
Peabody		1	1		1	1	3
Tate		1	1			1	3

The results in these three tables also indicate that the staff preferred using simple keyword searching over browsing and advanced searches, and have a small preference for browsing over advanced searching. Although the result set here is too small to tell for certain, these findings seem to support the results of a study reported in an article in the *Communications of the ACM*. The authors of the article reported users are not interested in the mechanisms of performing searches, and interfaces that require this are not usually successful.²⁰ The simple search was the easiest feature to use for both interfaces, and this is the feature the staff liked the most.

The last item on the survey asked the staff to indicate how pleased they were with the site as a whole. The staff's preference for the Tate demonstrated by this question will be further tested during the prototype phase of the project.

Table 27 - Overall, I was pleased with this search tool

	SD			N			SA
Peabody					3	4	
Tate					1	3	3

A few final items came up during the staff interviews that were not addressed in the survey.

- Participants liked drop lists as long as the list of items was not too long.
- The Peabody web page displaying the details for an individual object had a lot of wasted space and the text did not fit on one screen causing the users to have to scroll down to see all the information. The staff indicated they would prefer the text fit on one page where possible to avoid unnecessary scrolling.
- Participants needed better instructions on choosing keywords.
 - Peabody did not accept plurals on the advanced search.
 - On the Tate interface, no instructions were provided to explain the format for searching the artist name field in the database. Users were not told if they should enter the name in "Last name, First name" order or "First name Last Name" order.

These were relatively minor issues, but were still taken into consideration during the design phase of the project.

²⁰ Hearst, Marti, et al. "Finding the Flow in Web Site Searching." *Communications of the ACM* 45.9 (September 2002): 42-49.

4. DESIGN REQUIREMENTS AND PROTOTYPING THE DESIGN

With the initial data gathering phase of the project complete, the next step was to synthesize the information learned from the user needs assessment into design requirements and use these to develop a prototype of the system that could be tested with the users. Following is the list of requirements derived from the user needs assessment.

4.1 Design Requirements

Navigation

- Provide a clearly labeled hyperlink to the search pages that will not be easily confused with the hyperlink to search the museum website.
- Navigation links should be in a visible and easily accessible location.
- Provide a primary and secondary navigation system.

Page Layout

- Pages should not be too crowded and should not include scrolling images.
- The page should fit on one screen to avoid unnecessary scrolling, where possible.
- Pages should be aesthetically pleasing.
- Provide printer friendly pages.
- Changing label text from "artist, medium, culture" to "who, what, where" is not recommended.

Desired Feature Specifications

- Users indicated a preference for searching over browsing.
- Museum professionals need the capability to perform known item and advanced searches.
- Searches need to be both flexible and simple.
- Searches should not require the use of Boolean operators on the part of the user.
- Provide instructions on formatting keywords on simple and advanced searches.
- Support research discovery and fact checking.
- Allow for image acquisition without violating copyright restrictions.
- The Help features should include a list of keywords to assist users in becoming familiar with the collection.
- The organization of the items in the help lists should be clear. For example, the artist name list should be in alphabetical order by last name and not ordered by abbreviations for geographic location as was done on the Peabody website.
- Users liked the JavaScript functionality of clicking on an item in the list of keywords provided on the help pages and having the term copied into the search field.
- Drop down lists are acceptable as long as the list of items is not too long.
- Provide references for further research.
- Provide links to other museums with works by the same artist.
- Download time for pages with images needs to be considered for slow Internet connections.

4.2 - Prototypes

In their book, *Interaction Design: Beyond Human-Computer Interaction*²¹, Preece, Rogers and Sharpe recommend that after the design requirements are determined, the next step in designing an interface is to create a prototype of the proposed system. The authors suggest that early in the design process a low-fidelity model should be used such as paper or cardboard.

Using paper prototypes has several advantages. First, it provides users with a model they can see and interact with. This helps ensure that what the client is visualizing is the same model the designer is describing. Additionally, as Preece, Rogers and Sharpe point out, paper prototypes show "the intended functions and buttons, their positioning and labeling, and the overall shape of the device,"²² allowing users to identify problems or missing functionality.

Another advantage of using paper prototypes is that they do not require a lot of investment in terms of time or money on the part of the developer. This is important because the amount of resources devoted to a design is directly proportional to how resistant a designer will be when changes to the model are requested.²³ Additionally, when a designer has invested a lot of resources on a particular model, it becomes more difficult to realize the model may be seriously flawed and discard it for a better model.²⁴

While there were certainly other options when deciding on the type of prototype to use²⁵, paper prototypes worked quite well with this project because it required a prototype that did not require a lot of time or money to create, but would still provide an interactive structure to demonstrate the design to the users.

Prototypes were designed for most of the pages comprising the search interface including the simple search, the advanced search, the browse page, the search results page and the details page for items returned in the results. Prototypes were not designed for the page to show an enlarged image of an item and the help pages because the content for the pages did not include any items that required testing at this stage in the project. In all, there were nine prototypes; three for the simple search, two for the advanced search, two for the browse feature, one for the search results and two for the details page.

More than one prototype was developed for most of the features for two reasons. First, since paper prototypes are easy to make, this allowed the designer to present several possibilities to see which ones were preferred by the Ackland staff. The second purpose was to test the findings of the user needs assessment conducted with the Ackland staff.

²¹ Preece, Jennifer, Yvonne Rogers, and Helen Sharp. "Design, Prototyping and Construction." *Interaction Design Beyond Human-Computer Interaction*. New York: John Wiley & Sons, Inc., 2002. 239-278.

²² Ibid, p241.

²³ Siegel, David, and Tracy Rouchka. "Business: Demo-Driven Design or Design-Driven Demos: Vaporware, Demos and Prototypes." *interactions* 9.3 (2002): 25-30.

²⁴ Ibid, p26.

²⁵ Just to name a few, use cases, storyboards and static HTML pages are all other types of prototypes that could have been used.

As discussed in the section 3.2.4, the staff consistently indicated a preference for the Tate Museum interface over the Peabody Museum interface. The paper prototypes presented an opportunity to test the validity of these results.

The prototypes were designed by first creating a template in Microsoft Word showing the layout of the pages and the navigational elements that would consistently span all the pages. Then, the features for searching the collection and displaying the results were drawn by hand onto printed copies of the template.

Search Interface Prototype Template

Figure 15 – Microsoft Word Template for the Search Interface Prototype

Figure 15 shows the template created using Microsoft Word. This figure shows the items that were planned for inclusion on each page in the Ackland's on-line search interface. The template was designed without color because the designer's previous experience from other projects has shown that users tend to get caught up in the little things, such as colors and font style, and miss the big picture. The elements that are important to focus on early in the design process are the layout of the pages, the functions, the navigation and sometimes the labels.

Having stated this, however, it is necessary to mention one of the stylistic decisions made early in the design process. The current Ackland web site is fairly consistent, both in terms of the layout of the pages and the colors and fonts used on the pages. The Ackland uses a different colored border on the left margin of the pages to distinguish one sub-section of the site from another. The new interface for searching the collection database will be placed in the "Works of Art" section of the existing web site and will therefore use the same color scheme found in this section of the Ackland's web site.

The template for the search interface follows the pattern laid out in the Works of Art section. The items comprising the pattern include the Ackland logo in the upper left corner of the page which is a hyperlink to the Ackland home page. Additionally, a text hyperlink to the home page and the contact page is located in the upper-right corner of

the page. The bottom of the page again has links to the home page and contact page and includes the copyright information for the Ackland web site. The middle section of the screen is divided vertically; the left side is for navigation links and the middle and right side for page content. The links on the left navigation bar vary throughout the Ackland website depending on the content of the page.

The template for the new search pages follows this pattern, however, the links on the left navigation bar do not change; they are consistent on all the pages in the search interface. The reason for this is to make the pages consistent and help prevent the users from becoming disoriented. The links that were included on the left navigation bar were selected to provide users quick access to the pages the designer thought would be the most important pages and presumably therefore, the most sought after pages. These links lead to the Ackland home page, the browse page, the simple search page, the advanced search page and the help pages.²⁶

The final element in the prototype template is the secondary navigation bar located above the content section of the page, below the page header. This navigation bar contains the same links as the left navigation bar and is there to fulfill one of the design recommendations which was to provide a secondary means of navigating the search interface.

4.2.1 - Simple Search Prototypes

There were three different models designed for the simple search feature which varied in the number and type of text fields provided to the user to search the collection. Figure 16 shows the "Google" style search which consists of one text box to search all four fields in the database available in a simple search: artist, title, medium, and culture. Figure 17 shows the Tate Museum's simple search model which only allows keyword searching on the artist name and work title fields. The third prototype shown in Figure 18 allows searching on all four database fields in the simple search, but provides the additional functionality of drop down lists for the medium and culture fields to provide keyword assistance to the users. All three prototypes allow the users to limit the search results to only those records which have images.

Figure 16 - Prototype 1

Simple Search

Images only:

Figure 17 - Prototype 2

Simple Search

Artist Name:

Work Title:

Images only:

Figure 18 - Prototype 3

Simple Search

Artist Name:

Work Title:

Medium:

Culture:

Images only:

The Google style search provides the easiest and most flexible search mechanism, but the least amount of structure and guidance. The Tate style model provides some

²⁶ For purposes of this discussion, the phrase "Help pages" is used to refer to both the page containing the instructions on how to use the site and also the features provided to assist users in becoming familiar with the artists, mediums and cultures contained in the collection database.

structure and guidance and has fewer fields for the user to contend with, but is also the most restrictive of the searches. When compared to the Tate style model, the third prototype provides a wider variety of search options, but is more complex. When compared to the Google style model, the third prototype provides more guidance and structure, but the use of the drop down lists means that users cannot choose their own keyword terms for the medium and culture fields.

4.2.2 - Advanced Search Prototypes

The advanced search models vary in the level of flexibility provided to the user to perform the search. The models were based on the Peabody and Tate interfaces. The Peabody style model shown in Figure 19 has four text fields which each have a corresponding drop down list. The drop down list contains the fields available in the database that can be searched in an advanced search (artist, title, medium, culture, credit line and accession number). In this model, the users can change the item selected in the drop down list to determine which field will be searched in the database; for example, if a user is looking for two specific works of art by the artist Monet, the user can use "artist/Monet", "title/[title name]", "title/[title name]" to perform the search.

The Tate style model shown in Figure 20 provides one text box for each of the fields available in the advanced search. Both advanced search models provided the functionality of searching by date.

Figure 19 - Prototype 4

Advanced Search

Artist

Artist

Artist

Artist

Date of work: Use four digit year(s) below to
B.C.E. B.C.E.

Images only:

Figure 20 - Prototype 5

Advanced Search

Artist Name:

Work Title:

Medium:

Culture:

Accession No:

Fund Name:

Date of work: Use four digit year(s) below to
B.C.E. B.C.E.

Images only:

The Peabody style model allows the users to customize the search form to meet their individual needs making it a much more flexible search tool than the Tate style model. The drawback with this model is that the user has to do more work to perform a search and the form can be confusing. The advantage of the Tate style is that is easier to use, but allows little flexibility to the users.

4.2.3 - Browse Prototypes

There were two prototypes presented for the browse feature. One was modeled after the Peabody interface shown in Figure 21 which provides a drop down list of the topics

for the user to select from.²⁷ The second was a Yahoo style search shown in Figure 22 that displays a list of hyperlinks organized by topics corresponding to the information in the system. Both models provide the same functionality; the only differences in the models are how they work and the layout of the page.

Figure 21 - Prototype 6

The form is titled "Browse" in blue. It features a search input field with a downward arrow on the right side, containing the text "Subject (#)". Below the input field is the text "Images only:". To the right of this text is a rectangular button labeled "SEARCH".

Figure 22 - Prototype 7

The form is titled "Browse" in blue. It displays a list of search results. Each result consists of two columns, both labeled "Subject (#)". There are three such pairs of entries. Below the list is the text "Images only:" followed by an unchecked checkbox.

Both of the Browse prototypes have a number after the subject heading to indicate the number of records in the database corresponding to the keyword. For the sake of clarity, it should be noted that the term "subject" does not refer to a field in the database; a better choice would have been to use the term "keyword."

4.2.4 - Search Results Prototype

Only one prototype was designed for the search results page. Based on the review of other museum websites previously discussed, there are two main models for presenting the search results. One model divides the results into small groups and presents them using multiple pages with several items of descriptive text for each item (Section 2.1, Figure 4). The other model displays all the results on one page with minimal descriptive text (Section 2.1, Figure 5). Since the results of the user needs assessment conducted with the Museum's patrons indicated that download time would be an issue, the first model was selected to be the default model for displaying search results to the user because it requires significantly less download time for large result sets. The second model and a text only model (Section 2.1, Figure 8) were incorporated into the design of the default search results model as optional alternative views.

4.2.5 - Result Details Prototypes

There were two models designed for the Details page. The differences in the prototypes were minor because they only affected the layout of the page content and not the functionality provided on the page. The only differences in the models were the location on the page of the image, the text descriptions and the navigational features used to maneuver within the search results.

4.3 - Prototype Review

The review was used to accomplish several purposes. First, the prototypes were examined to ensure they met the design requirements determined during the user needs assessment. The review also allowed for further exploration of the results from the user needs assessment and to determine the prototypes the Museum staff preferred

²⁷ The Tate's browse feature was not included because it uses a Java application which was not an option for this project. However, during the user needs assessment it was clear the Ackland staff preferred the Tate's browse feature and it will be included in the list of recommendations for future development.

for the search interface. The prototypes were not tested in a formal manner with both patrons and staff, but rather were reviewed with the same Ackland staff who participated in the user needs assessment. All of the staff were interviewed separately with the exception of the two educators. They were interviewed jointly to review the prototypes which is a technique employed in usability testing to elicit more discussion from participants.

The reviews lasted from 30 minutes to an hour and consisted of showing the prototypes to the users and asking them their opinion on the each prototype. Additionally, users were asked to select the prototype they preferred for each of the pages presented and explain why they selected that model over the others.

The researcher took notes during the conversation to record the users' comments, preferences and suggestions for revisions on the models. Using a semi-structured interview²⁸, the researcher also participated in the discussion to explain the rationale behind the designs and ask the participants about specific features on each of the prototypes.

4.4 - Prototype Review Results

4.4.1 – Simple Search Prototype

For the simple search page, most of the users preferred the third prototype (Figure 18) because the labeled form fields give the users some indication of what types of information are available on the simple search. This prototype also provides keywords for the medium and culture fields through the use of drop down lists. The educators in particular liked this model because they thought the Google style model would be too intimidating for young schoolchildren. All the users who preferred the Google style model did so because it is the easiest and most flexible of the simple search prototypes. However, when presented with the educators' concerns, and shown the options available for the advanced search, all the users agreed the third prototype should be used for the Ackland's search interface. None of the users selected the Tate style interface, Figure 16, because it was too restrictive.

4.4.2 – Advanced Search Prototype

For the advanced search prototypes, some of the users were concerned with the complexity involved in using the Peabody style model (Figure 19) but after some discussion about how the form would potentially be used, decided that it was acceptable for the advanced search to require a certain amount of skill to use. The users were also more inclined to use this model because it provided the flexibility that was lost by selecting prototype three for the simple search. The combination of these two models provides structure and guidance on the simple search and flexibility on the advanced search. All the users were agreeable to using the Peabody style model for the Ackland's advanced search interface.

However, the question that was not addressed in selecting a design for the advanced search feature is how it will be used in a production environment. It is not known to the participants in this study if the level of flexibility provided by the Peabody style model is

²⁸ Appendix H contains the list of items addressed in the semi-structured interviews.

useful. In the past, when members of the Ackland staff used an on-line image database, if they wanted to a search for works of art by two different artists, they performed two searches. They were not certain that if given the option to perform one search to retrieve both artists they would do so. The staff erred on the side of caution and decided that providing too much functionality was better than not enough, so they went the Peabody style model. If the functionality provided on the advanced search is not needed, then it should probably be changed to a design that is easier to use. This issue really needs further investigation and will be included in the list for the future.

4.4.3 – Browse Prototype

For the two browse prototypes, most of the users did not have a really strong preference because the functionality provided on the prototypes was the same. The one person who did have a preference preferred the Yahoo style model because it required fewer steps to perform the search. In this model, users click on a hyperlink and the search results are displayed. In the drop down list model, users have to open the list, scroll down to find the keyword they want, select it, and then click the search button.

However, the conversation regarding which browse feature to use ended up being moot for several reasons. The first two reasons were related to the time constraints of project. To implement a browse feature there needs to be a standardized list of keywords for each browse category. For the most part, the data in the Ackland's collection database is not standardized and it would have taken too much time to standardize the data to a reasonable enough degree to develop a list of keywords. Also, if a browse feature were to be implemented, the current Works of Art section of the Ackland web site would need to be incorporated into the design of the new search interface to avoid having two sections of the web site devoted to browsing objects in the collection. Finally, the Ackland staff would prefer to have a browse feature like the Tate Museum's interface which is designed in Java and will also require the Ackland's data be standardized. Given all these concerns, it was decided the best solution was to add a sophisticated browse feature to the list for future development and spend the small amount of development time available during this project on creating the search pages. Due to this decision, the link on the left navigation bar entitled "Browse" was replaced with the link to the home page for the Works of Art section of the Ackland's web site.

4.4.4 – Search Results Prototype

The search results page only had one prototype, but the users were all satisfied with the design. The primary concern in designing this page was providing the appropriate navigation to maneuver within the search results. During the website review undertaken during the field experience, it was noticed that many web sites do not provide a complete set of navigation aids. Some sites did not provide a link to return to the search form, but only to the home page of the search site. Also, the link to reach the details page of an object was often not placed in an obvious location. Many websites used the image and the text describing it as the hyperlink to the details page, but if users did not realize this, they would not know a details page existed.

Another navigation problem was related to result sets that had multiple pages; users often were only given the option for previous and next, but not first and last. This was commented on several times during the user needs assessment as being a problem.

The location of the navigation on the results page was also an issue that came up frequently during the user needs assessment.

The search results page prototype was designed to address all of these concerns. It included a link to return the user to the search form at the both the top and bottom of the page, since the search results would often not fit on the screen requiring users to scroll down.

Two links were also provided to reach the details page. One is a textual link label "Details" which was placed under the description information for the object. This was done to notify users that additional information was available for the object. The second link was embedded in the HTML image source tag used to display the image, which is a standard feature for image database interfaces.

The navigational aids to move within multi-page result sets included options to go forward or back one page, or go to the first or last page in the result set. The page number currently being viewed by the user was also included. This feature was also placed at the top and bottom of the page. The total number of records returned for the search was shown at the top of the page and the records currently being viewed by the user were shown at the top and bottom of the page.

An additional feature placed on the search results prototype was the option for users to change the layout of the page. Three icons were placed at the top of the page representing the default view (the layout of the search results page when users first perform a search), a thumbnail view and a text only view. The default view list 10 items per page with descriptive information displayed to the left of the image. The thumbnail view shows all the search results on one page and the text only view is identical to the default view except no images are returned. To switch views, users only need to click the corresponding icon and the page reloads using the appropriate layout.²⁹

The final issue that needed to be addressed on the search results page was how to deal with objects that had multiple images. All the objects that have images in the database have a small, medium and large version of the image, but in some cases, there is more than one view for an object. This causes the object to show up multiple times in the search results. The Registrar and Assistant Registrar prefer that only one record be returned for each object, so it was decided that one view would be selected as the primary image to be shown in the search results. The details page will contain a link to additional images when this case arises.

The Ackland staff were all please with the design of the search results prototype and felt it adequately addressed their concerns.

4.4.5 – Result Details Prototype

The search details page had two prototypes that differed in their layout, but not in their functionality. One prototype was based on the Tate Museum's details page and the other on the British Museum's. The Ackland staff generally preferred the British

²⁹ This idea was borrowed from the Hirshhorn Museum website.

Museum model because the navigation was separated from the page content, which was not the case on the Tate interface. The Tate used a shaded bar to display the artist name on one side of the page and places the navigation in the bar on the other side of the page. The Ackland staff preferred the navigation placed at the top page, away from the content.

The staff were also concerned about placing the artist name in such a prominent location on the page because many of their works do not have a known artist. In these cases, the Ackland uses the term "Unknown" which would look strange when displayed in a prominent location.

There were several additional concerns regarding the details page. First, the navigation provided needed to meet the same criteria as the search results page and also include a link to return to the search results. Additionally, a link was needed to reach the page displaying an enlarged view of the image when one was available. Both prototypes meet these requirements.

Additionally, the director of the museum was concerned that the image displayed on the details page be larger than the thumbnail image displayed on the search results page. The Ackland database has three sizes for all their images, so this was not a problem. The medium size image could be used on the details page without violating copyright restrictions because it is still a small enough sized image to be considered a thumbnail as defined by copyright law restrictions.

Finally, the staff wanted the details page to fit on one screen where possible. This is not a problem except in cases where an object has a long description. The Ackland staff understood this exception.

4.4.6 – Other Elements

The final element discussed during the prototype reviews was the location of the help features on the left navigation bar. First, one of the staff noticed that the items on the left navigation bar were not logically organized. The "Help" link was located in the top half of the bar with the links Ackland Home, Browse, Simple Search and Advanced Search. The bottom half of the bar contains the links to the list of keywords which would logically be considered help. To remedy the illogic of this design, the Help link was moved to the lower half of the navigation bar so that all the help features were grouped together.

Also, the prototypes did not include a keyword list for the date field, which is available for searching on the advanced search form. The dates in the database are not standardized, so it was decided to add a link on the left navigation bar for a list of dates.

The left navigation bar was also changed to include a link to a page for additional resources, a feature that was requested by some of the Ackland's patrons during the user needs assessment. Originally, a link to additional resources was placed on the advanced search page with the intention of moving it to a better location, once a location was determined. During the course of the reviews, it was decided that this

feature falls into the help category so it was placed on the left navigation bar with the other help features.

One final change to the prototypes was made based on the reviews with the Registrar and Assistant Registrar. The "medium" field in the database is not standardized and the terminology varies widely. However, the "category" field is standardized and has been consistently applied in the database. It was decided that the category field would provide much more reliable search results than the medium field, and could easily be used as a drop down list since it only contains nine options. The design requirements were changed to use the category field on the simple and advanced search pages instead of medium.

4.4.7 – Comparison with User Requirements

The final process in the prototype review was to take the list of requirements derived from the user needs assessment and determine if the prototypes fulfilled all the requirements.

Navigation

1. Provide a clearly labeled hyperlink to the search pages that will not be easily confused with the hyperlink to search the museum website. *This was not addressed by the prototypes.*
2. Navigation links should be in a visible and easily accessible location. *This was addressed on the prototypes by providing a navigation bar on the top and left side of the pages for the entire search interface and the navigational aids located on the search results and search details pages.*
3. Provide a primary and secondary navigation system. *This was addressed on the prototypes by providing a navigation bar on the top and left side of the pages for the entire search interface.*

Page Layout

- Pages should not be too crowded and should not include scrolling images. *This was addressed by the prototypes.*
- The page should fit on one screen to avoid unnecessary scrolling on the result detail pages, where possible. *This was addressed by the prototypes.*
- Pages should be aesthetically pleasing. *This was addressed by the prototypes.*
- Provide printer friendly pages. *This was not addressed by the prototypes.*
- Changing label text from "artist, medium, culture" to "who, what, where" is not recommended. *This was addressed by the prototypes.*

Desired Feature Specifications

- Users indicated a preference for searching over browsing. *This was addressed by the simple and advanced search prototypes.*
- Museum professionals need the capability to perform known item and advanced searches. *This was addressed by the advanced search prototypes.*
- Searches need to be both flexible and simple. *This was addressed by the simple and advanced search prototypes.*
- Searches should not require the use of Boolean operators on the part of the user. *This was addressed by the prototypes.*

- Provide instructions on formatting keywords on simple and advanced searches. *This was not addressed by the prototypes.*
- Support research discovery and fact checking. *This was partially addressed on the prototypes by providing an advanced search, but the browse feature is limited.*
- Allow for image acquisition without violating copyright restrictions. *This was addressed by using thumbnails on the search results and details prototypes.*
- The Help features should include a list of keywords to assist users in becoming familiar with the collection. *This was addressed by the artist name, category, culture and date lists located on the left navigation bar.*
- The organization of the items in the help lists should be obvious. For example, the artist name list should be in alphabetical order by last name and not ordered by abbreviations for geographic location as was done on the Peabody website. *This was addressed by the prototypes.*
- Users liked the JavaScript functionality of clicking on an item in the list of keywords provided on the help pages and having the term copied into the search field. *This was not addressed by the prototypes.*
- Drop down lists are acceptable as long as the list of items is not too long. *This was addressed on the prototypes by dividing long lists into multiple, shorter lists such as the artist name list which was grouped using the first letter of the last name.*
- Provide references for further research. *This was addressed on the prototypes with the inclusion of the additional resources page.*
- Provide links to other museums with works by the same artist. *This was addressed on the prototypes with the inclusion of the additional resources page.*
- Download time for pages with images need to be considered for slow Internet connections. *This was addressed by restricting the search results prototype to 10 thumbnail sized images per page.*

5. IMPLEMENTING THE DESIGN

The review of the paper prototypes indicated the proposed design met most of the design requirements gathered during the user needs assessment and was ready to be implemented. This section of the paper first discusses the implementation process including the hardware and software specifications, the problems encountered with the data in the database and the database documentation and problems encountered with the web server and browser. Next is a discussion of the additional design decisions required to build the interface and the features that were not implemented in the this version of the interface due to time constraints. This section of the paper concludes with images of the interface pages built during the implementation phase of the project.

5.1 - Hardware and Software Specifications

All of the hardware and most of the software used in the development of the Ackland's on-line collection search interface was determined by decisions previously made by the Museum's administration. As discussed in section 2.2 of this paper, the Museum's collection database is an Oracle 8i relational database system purchased from the Willoughby Associates company. Due to the support contract the Museum has with the database vendor, the structure of the database cannot be modified, so no changes were made to support the design of the interface.

The location of the database and web servers was also previously determined by the Museum's administration as discussed in section 2.2. Since the web server is not maintained by the Ackland, the server software is also outside the scope of this application. The department maintaining the web server uses a Unix based operating system and Apache web server software.

The only software decision made during the course of this project was the scripting language used to connect the search web pages to the database. Currently, the most popular choices for this type of application are Active Server Pages (ASP), JavaScript Server Pages (JSP), PHP and ColdFusion. The use of PHP was selected for the Ackland's Internet interface because the web server running the application supports PHP, so installing and configuring new software would not be needed with this choice. Additionally, the use of one of the other technologies would not have provided any advantages over PHP, so there were no drawbacks to using this scripting language.

Since the decision was made to use PHP, the administrative piece of the PHP script provided by the database vendor could be incorporated into this project.³⁰ These pages consist of a data entry form, a form action page and an include file used to gather and store the information to connect the web pages to the database server.

A test page was developed during the field experience, discussed in section 2.2, using the connection information stored in the administrative pages to connect the test page to the database. Therefore a working connection was already established for use by the search application and did not need to be built during the implementation phase of the master's project.

5.2 - Data Standardization and Integrity

As earlier noted, the data in the collection database does not use a controlled vocabulary which posed several problems during the implementation. The first problem concerned the data in the artist name field, which affected search and display of the retrieved data. This field is formatted in the order "artist last name, first name" for objects that have only one maker. For objects where the maker's name is unknown, the term "Unknown" was entered in artist name field. For records where the object has more than one artist, the artists' names are entered in separate records, but the format is "artist last name, (culture information related to the artist), artist first name." The Ackland staff did this so each artist's cultural information would display beside the name when a work had more than one maker.

This structure poses several problems when searching the database. The Ackland staff want users to enter the artist name in "first name last name" order, but given the format of the data in the database, this would make matching very difficult. The issue could be addressed using a function to reverse the order of the names entered by the user, but for records in the database that have cultural information in the artist name field, any search using the first and last name will not work because the cultural information is between the artist's last and first names in the database.

³⁰ See section 2.2 for discussion on Willoughby PHP script.

The Ackland staff also want the artist name displayed in “first name last name” order on the search results page, which again is a problem involving the data in the artist name field. The data returned from this field in the database cannot be parsed by a simple function to find the first comma and reverse the order of the names because the records that contain cultural information and the fields where the artist name is Unknown either do not have commas or have multiple commas that are not placed in the field using a standardized format.

After some discussion with the museum registrar and assistant registrar, it was decided they will not remove the cultural information from the artist name field, but will change the data in the database so that the cultural information will not contain commas that will interfere with a function to reverse the order of the artist first and last name both for purposes of searching the database and displaying the results. This function will also need a clause to address the records that do not have commas such as works of art with an “Unknown” maker. Following are examples of the artist name data in the current storage format and the proposed storage format.

Table 28 - Artist Name data from collection database

CURRENT STORAGE FORMAT	PROPOSED STORAGE FORMAT
ABBEMA AND FRITZ WERNER AFTER CARL FRIEDRICH LESSING, WILHELM VON	ABBEMA, WILHELM VON AND WERNER, FRITZ AFTER LESSING, CARL FRIEDRICH
ADAM AND HENRI CAMUS AFTER RICHARD PARKS BONINGTON, VICTOR	ADAM, VICTOR AND CAMUS, HENRI AFTER BONINGTON, RICHARD PARKS
NYMAN, FOR NOTSJO GLASSWORKS, NUUTAJARVI, FINLAND, GUNNEL	NYMAN, GUNNEL FOR NOTSJO GLASSWORKS, NUUTAJARVI FINLAND
NIE (FRENCH, 1732-1817) AFTER CLEMENT PIERRE MARILLIER (FRENCH, 1740-1808), FRANGOIS DENIS	NIE, FRANGOIS DENIS (FRENCH 1732-1817) AFTER MARILLIER, CLEMENT PIERRE (FRENCH 1740-1808)

The second problem concerned data in the Item_Date field in the Catalogue table; which primarily affected searching. Values in the field are a combination of text and numeric data. Below are some examples of the date data.

Table 29 - Item Date data from collection database

fairly early	325-275 B.C.
15th century	1-1-58
11th-12th century	2001
15th-17th centuries	1496/97
4th century B.C.	c. 1800 ?
3rd quarter of 5th century B.C.	ca. 1300
4th edition, 1906	1887, cast after 1905
first millennium	1977, from a 1979 portfolio of 30 photographs

The Advanced Search form allows users to search the date field using numeric years, so any script written to search on this field would need to capture the numeric dates in the database in addition to the corresponding century. Additionally, the database does not have a way to distinguish between Common Era (C.E./A.D.) and Before Common Era (B.C.E./B.C.) dates, so a function would need to be scripted for this as well. However, even with a very complex script, any date search performed will always return some unexpected results and miss some items as long as the data is entered in a non-standardized format such as “first millennium” or “fairly early”.

The solution to this problem is to use the vendor's table Date_Made in the database that has two separate date fields for each work of art, earliest year and latest year. The data in these fields are all numeric, thus eliminating the problem with century and miscellaneous text descriptions. However, the data in these fields were entered by an automated script provided by the database vendor and have not been checked for accuracy, which will need to be done before the application is put into a production environment.

This solution also does not address the problem of objects created before the beginning of the Common Era. This problem is still under investigation and is included in the list of items to fix in the upcoming revisions.

The culture field also presented a challenge because many of the records include date information. The reason for this format is that cultures change over time so a work produced in the Colonial American time period may be very different from a work created in the American 20th century period. However, this presents a problem when trying to create a list of keywords for a drop down list generated automatically³¹ by the database because the list would have two different entries for "American, 1745-1816" and "American, 1921-1997". The database sees these as two unique values and would include both values in an automatically generated drop down list. The Mimsy database currently has 3812 unique values for the culture field.

While the list of unique entries returned by the database for the culture field was too long to use as an automatically generated list, upon review of the data, it was possible to remove the date information and create a list of reasonable length, approximately 200 keywords, which was used to build a static culture keyword help list for the simple search form and left navigation bar.

Another issue related to data integrity concerns the existence of multiple images in the database for the same object. While it is beneficial to the users that some objects have images that provide different views, having each image returned in the search results makes it appear that there are duplicate entries in the database. The Ackland staff would prefer for the primary image to be shown on the search results page and additional views displayed on the details page.

In order for this to happen, the secondary images in the database had to be marked as such. This was accomplished during the course of building the interface, but a feature to capture the duplicate records on the details page has not yet been implemented.

The final problem encountered with the data was a referential integrity issue between the tables containing the description of the objects in the database and the tables

³¹ The advantage of having a list created automatically by the database is that any time a new keyword is entered in the database field it will automatically be added to the list of values in the drop down list. The other method is to create a static list and code the static list into the HTML "select option" form field tag. Each time a new keyword is added to the database, the web page will need to be updated as well.

containing the pointers to the location of the images on ATN's servers³². Each of the three tables contain records that do not match the records in the other two tables which prevents the database from correctly linking the records together. Because of this, the outer joins necessary to return all the records in the database regardless of whether or not they have images are not working. This is a huge problem because there are over 15,000 objects in the database and fewer than 2000 of those have images. At present, this problem is causing the database to only return about 1100 objects.

The referential integrity issues are being addressed by the Registrar's office which should resolve the problem.

One other interesting problem that occurred was related to the database documentation and the way the vendor set up the user account for the web pages. The Mimsy database comes with a data dictionary³³ that is supposed to be a complete listing of the tables and views in the database. However, during the course of building the search interface, one of the fields listed in the data dictionary as being in the catalogue table was not accessible by the web page user account. It seemed like a really bizarre problem because other user accounts could access the field, just not the web page user account.

After some exploration of the database structure involving the database administrator at AIS, it was realized that the user account was not using the tables listed in the data dictionary, but was instead using a series of views that are not listed in the data dictionary. Additionally, the name for the date field in the view (item_date) was not the same as the name in the table (date_made). The naming issue is an inconsistency in the database structure because all the other views in the database use the same field names as used in the corresponding tables. The fact that the data dictionary does not contain the complete list of views is also a problem. While this issue was easily resolved once the source of it had been determined, it did slow down the implementation process and could easily have been avoided with better documentation.

5.3 - Web Server and Browser Problems

The location of the directory containing the Ackland's images on ATN's server also caused some difficulties. The directory is not in the public_html folder on the web server which was causing a problem with the HTML code on the search interface web pages. The web pages are in the public_html folder which is reached using the URL alias "http://php.unc.edu...". When the correct path name for the directory containing the images was used in the HTML code, the web server tried to convert it to the URL alias which only works for files in the public_html folder. This resulted in the web browser never being able to locate the images and thus the web pages displayed a broken link instead of the image.

³² The images are not actually stored in the database, although when discussing them they are often referred to as if they are. In reality, image databases usually store the network path of the server where the images are located. In the case of the Ackland's collection database, the images are stored on a distributed server network maintained by ATN.

³³ *MultiMimsy 2000 Book Database Structure* (Version 2.5). Winnetka, Illinois: Willoughby Press, 2000.

The solution to the problem involved creating a Unix link (not to be confused with an HTML hyperlink) in the public_html directory the web server which points the web browser to the directory where the images are stored. Despite the simplicity of the solution, it took a long time to figure out the source of the problem which was confounded by the lack of support on the part of some of the members of the department maintaining the web server.

The level of technical support, which is complicated by the distribution of the servers and responsibilities for the Ackland's database and web site, is a concern for the long-term support of the search interface.

One final problem that arose during the course of the implementation process was with the simple and advanced search features. The search interface performs case sensitive searches against the database which does not happen with other applications that search the database such as the internal database forms used by the Ackland staff. This is problematic because the search term "adams" will not return the works of art by Ansel Adams, but "Adams" will. Requiring the user to enter the proper case is tedious and will need to be addressed in the upcoming revisions.

5.4 - Additional Design Decisions

There were a few other issues that arose while building the interface that needed to be addressed. First, since users were not going to be required to use Boolean operators, the search interface needed to handle this functionality. The Ackland staff decided the simple search would perform searches using the "AND" operator and the advanced search would use the "OR" operator. The reason for this decision was to keep the simple search result set focused to try to avoid confusing the user by returning a large result set that would potentially contain a lot of unexpected results. The "OR" operator was used on the advanced search on the assumption that a person using this search would prefer to have all the possible records matching the search criteria returned in the search results. This decision bears further monitoring by the Ackland staff to determine how users expect the simple and advanced search features to work and will be included in the list of recommendations for the future.

Related to this decision was the location of the wildcards around the search term. Placing the wildcard operators at the beginning and end of the search terms would increase the number of results returned, compared to just placing the wildcards at the end of the search terms. To remain consistent with the decision made regarding the Boolean operators, it was determined the wildcard operator would be placed at the end of the search terms on the simple search and at the beginning and the end of the search terms on the advanced search. The artist name field on the simple search was an exception to this rule because of the proposed format change discussed in section 5.2; the artist name will need to have wildcards at the beginning and end of the search term. The placement of the wildcards also bears further investigation.

There were also several design decisions related to the layout and content of the pages. First, a decision needed to be made regarding the content that would be placed on the first page of the search interface. Some museums have an introductory page for the collection search section of their website, (e.g., the Peabody Museum used in the staff

user needs assessment), and some just start with the simple search page (e.g., the Tate Museum). During the user needs assessment the Ackland staff did not look at any of the introductory material on Peabody site, and only one person used the instructions, but only after encountering a problem. This evidence indicated that users prefer to search first and ask questions later. Based on this, it was decided the simple search page would be the first page of Ackland's collection search interface.

An additional design decision related to the content of the pages is the removal of the secondary navigation system located at the top of the page between the header and content sections of the paper prototypes to provide a back up system for the left navigation bar. The secondary navigation system was included on the paper prototypes because the user needs assessment showed that users often overlook navigational links no matter how prominent they seem to the interface designer. The secondary navigation system was removed because the search results pages provided duplication for the left navigation bar. The links at the top of the page were no longer needed for this purpose and were taking up valuable real estate on the page.

A final note regarding features that were implemented during the initial development phase was the use of separate web page files for the header, footer and left navigation bar that comprise the search interface template. As discussed in the previous section of this paper, all the pages in the interface will have the same header, footer and navigation bar on the left side of the screen. Instead of putting the HTML code for each of these items on every page in the interface, it was placed in separate "include files" which are designed to show up on each of the web pages. Implementing the code in this manner means that when the pages need to be changed, only one file needs to be updated instead of every page in the interface.

5.5 - Features Not Implemented

In order to leave time for usability testing, some desired features for the interface were not implemented in the initial version of the interface. A revision for the interface is pending which will include the following items.

- Create a script to search and display artist name in first name last name order.
- Make the simple and advanced search features case insensitive.
- Implement the advanced search feature that allows users to search the database by date.
- Implement the feature on the search details page to show multiple views of an object when they exist.
- Create a JavaScript function that will copy keywords selected by the user in the drop down list and paste them in the form fields on the search pages.
- Include a NoScript function to support web browsers that do not use JavaScript.
- Include help and formatting instructions on the search and help pages.
- On the help page, list the Ackland's policy on image acquisition and reproduction.
- For images that have reproduction restrictions, display the restriction on the page showing the enlarged image.
- Provide text-only pages and conform with accessibility guidelines.
- Create a set of Cascading Style Sheets to reduce website maintenance time.
- Create a sitemap for the search pages.

- Create a page that provides basic information about the technology used to implement this project.
- Perform tests to ensure the SQL queries used by the simple and advanced search features are accurate.
- Provide a printer-friendly page to print images where allowed by copyright restrictions.
- Provide a clearly labeled hyperlink on the Ackland's home page to reach the search interfaces pages that will not be easily confused with the hyperlink to search the museum website.

The implementation phase for this project was concluded by again reviewing the list of design requirements derived from the user needs assessment to ensure that they were included either in the interface or on the list of upcoming revisions listed above.

This section of the paper concludes with images of the search forms and search results pages of the interface created during the implementation phase of the project.

Figure 23 – Simple Search (Search Collection Interface Home Page)

The screenshot shows the 'Simple Search' page of the 'On-line Collection' website. The page has a blue sidebar on the left with navigation links: 'Ackland Home', 'Works of Art', 'Simple Search', 'Advanced Search', 'Help', 'Additional Resources', 'Artists' (with a grid of letters A-Z), 'Category', 'Culture', and 'Date'. The main content area is titled 'Simple Search' and contains the following fields and options:

- Artist:** A text input field with a placeholder 'Last name, First name (e.g. Smith, John)' and a note 'Search is case sensitive'.
- Title of Work:** A text input field.
- Category:** A dropdown menu with the text 'You may select a category'.
- Culture:** A dropdown menu with the text 'You may select a culture'.
- Return only objects with images:** A checkbox.
- Buttons:** 'Search' and 'Clear' buttons.

The footer of the page includes 'Ackland Home | Contact' and '© Copyright 2001 Ackland Art Museum'.

Figure 24 – Advanced Search

The screenshot shows the 'Advanced Search' page of the 'On-line Collection' website. The page has a blue sidebar on the left with navigation links: 'Ackland Home', 'Works of Art', 'Simple Search', 'Advanced Search', 'Help', 'Additional Resources', 'Artists' (with a grid of letters A-Z), 'Category', 'Culture', and 'Date'. The main content area is titled 'Advanced Search' and contains the following fields and options:

- Select a topic:** Four dropdown menus, each followed by a text input field.
- Date:** A text input field with a placeholder 'Use Numeric Year(s) (e.g. 0, 100, 1942)', followed by a checkbox for 'B.C.E.' and a text input field, and another checkbox for 'B.C.E.' and a text input field.
- Return only objects with images:** A checkbox.
- Buttons:** 'Search' and 'Clear' buttons.

The footer of the page includes 'Ackland Home | Contact' and '© Copyright 2001 Ackland Art Museum'.

Figure 25 – Search Results Default View

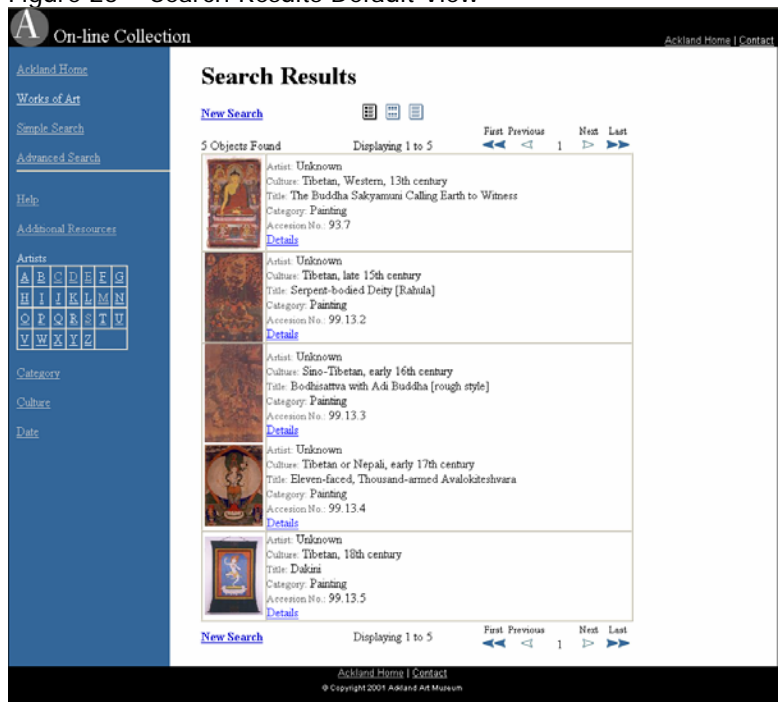


Figure 26 – Search Results Thumbnail View

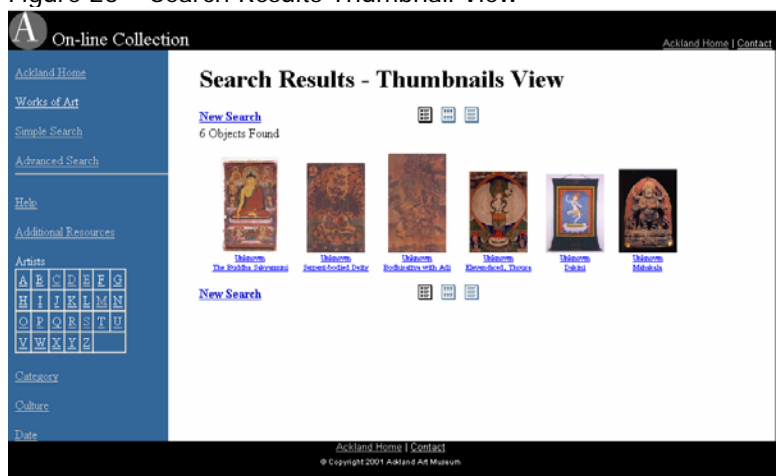


Figure 27 – Search Results Text-only View

A On-line Collection Ackland Home | Contact

[Ackland Home](#)
[Works of Art](#)
[Simple Search](#)
[Advanced Search](#)

[Help](#)
[Additional Resources](#)

Artists

A	B	C	D	E	G
H	I	K	L	M	N
O	P	Q	R	S	T
U	V	W	X	Y	Z

Category
Culture
Date

Search Results - Text Only View

[New Search](#) First Previous Next Last
 << < 1 > >>

5 Objects Found Displaying 1 to 5

Artist: Unknown
Culture: Tibetan, Western, 13th century
Title: The Buddha Sakyamuni Calling Earth to Witness
Category: Painting
Accession No.: 99.13.7
[Details](#)

Artist: Unknown
Culture: Tibetan or Nepali, early 17th century
Title: Eleven-faced, Thousand-armed Avalokiteshvara
Category: Painting
Accession No.: 99.13.4
[Details](#)

Artist: Unknown
Culture: Sino-Tibetan, early 16th century
Title: Bodhisattva with Adi Buddha [rough style]
Category: Painting
Accession No.: 99.13.3
[Details](#)

Artist: Unknown
Culture: Tibetan, late 15th century
Title: Serpent-bodied Deity (Rahula)
Category: Painting
Accession No.: 99.13.2
[Details](#)

Artist: Unknown
Culture: Tibetan, 18th century
Title: Dakini
Category: Painting
Accession No.: 99.13.5
[Details](#)

[New Search](#) First Previous Next Last
 << < 1 > >>

Ackland Home | Contact
 © Copyright 2001 Ackland Art Museum

Figure 28 – Details

A On-line Collection Ackland Home | Contact

[Ackland Home](#)
[Works of Art](#)
[Simple Search](#)
[Advanced Search](#)

[Help](#)
[Additional Resources](#)


Artists

A	B	C	D	E	G
H	I	K	L	M	N
O	P	Q	R	S	T
U	V	W	X	Y	Z

Category
Culture
Date

Object Details

First Previous Next Last
 << < 4 > >>
[New Search](#) [Search Results](#)

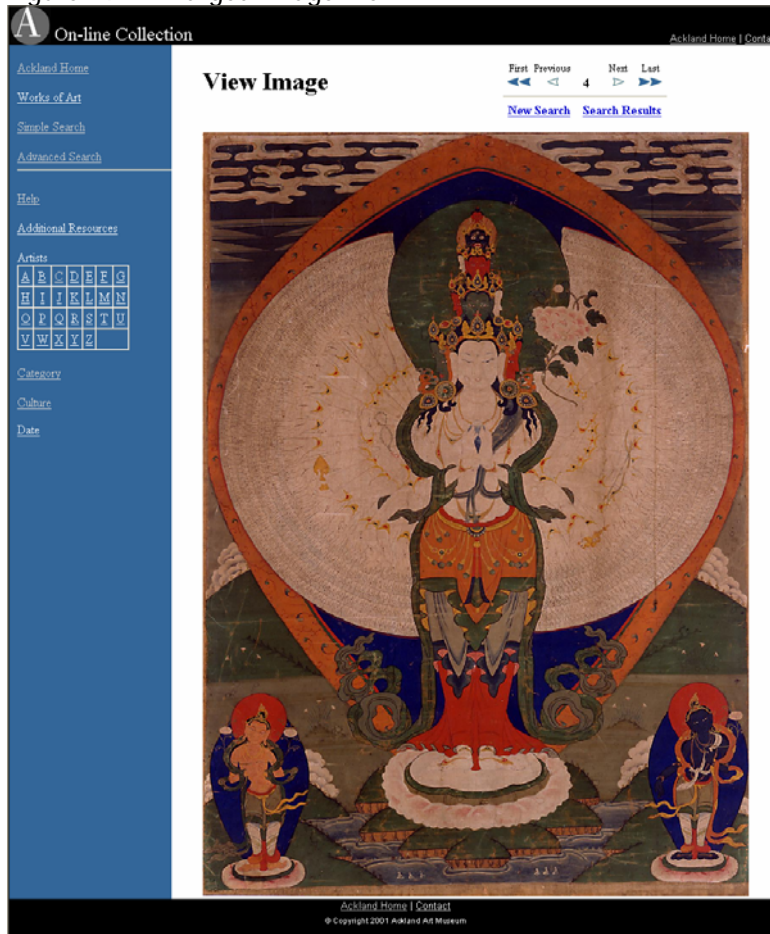


[Enlarge](#)

Artist: Unknown
Culture: Tibetan or Nepali, early 17th century
Title of Work: Eleven-faced, Thousand-armed Avalokiteshvara
Dates: early 17th century
Medium: tanka; color on cotton
Category: Painting
Dimensions:
Credit Line: Gift of Ruth and Sherman Lee
Accession No.: 99.13.4

Ackland Home | Contact
 © Copyright 2001 Ackland Art Museum

Figure 29 – Enlarged Image View



6. EVALUATING THE DESIGN

An important aspect of interface design is evaluating the system to ensure that its intended audience can use it. According to the authors of the text *Interaction Design*, it is also important for the users to like the system. The authors state many designers believe that what they think is a useable, likeable system will also receive the same reaction from its intended users. This is not always the case and the authors argue that the potential users of the system should therefore be involved in an evaluation of the system³⁴.

While there are many evaluation techniques available to test the usability of a system, this project used a usability study to test the Ackland's search interface. This type of system evaluation can be informal and has several variations. Generally, users are given a series of tasks to complete using the system in question. Sometimes users are left alone with the tasks and instructions and asked to record the actions they took to complete the tasks. In other methods, the users are observed by an evaluator who

³⁴ Preece, Jennifer, Yvonne Rogers, and Helen Sharp. "What, Why and When to Evaluate." *Interaction Design Beyond Human-Computer Interaction*. New York: John Wiley & Sons, Inc., 2002. 317-324.

takes notes on the users' actions. Users may be asked to "think aloud" to aid the evaluator in determining what is causing them difficulty.³⁵ Yet another technique involves using two testers; this makes the test more natural for the participants since conversing with another person is a part of every day communication, unlike the think aloud method.

In his books on usability engineering, Jakob Nielsen provides guidelines for designing and conducting a usability test^{36,37}. Decisions the designer should consider include the following.

- What is the goal of the test?
- Where and when will the test be conducted?
- How long will each session last?
- Will computer support be needed during the test sessions?
- What tasks will the users be asked to perform?
- What user aids will be available and how much help can the observer give during the test?
- The tasks should be representative of how the system will be used when it is in production.
- The tasks should provide reasonable coverage of the most important aspects of interface, but be small enough to complete them all in the allotted time.
- Tasks should not be trivial.
- Specify the expected result(s) from performing the task.
- Task should be written to ensure all testers receive the same questions and for use as a reference during the test.
- After reading a task, the user should be given a chance to ask questions.
- Start with something easy to build the user's confidence.
- End with something that gives the user a sense of accomplishment.
- Never give the user a list of tasks, give them one at a time to allow the user to stop at any time without feeling inadequate.

There are also recommended guidelines on how to conduct the test itself.

Prior to beginning:

- Explain to the user that the purpose is to test the application, not the user.
- It is OK for users to speak freely about problems with the system.
- It is OK for users to ask questions.
- Give any specific instructions needed.
- Ask the user if he/she has any questions.

During the test:

- Refrain from interacting with the tester.
- Do not express any personal feelings about the system.
- Do not help the user too early and only help if necessary.

³⁵ Goldman, Kate Haley, and Laura Bendoly. "Investigating Heuristic Evaluation: A Case Study." *Museums and the Web 2003: Selected Papers from an International Conference* (2003): 145-152.

³⁶ Nielsen, Jakob. *Usability Engineering*. Boston: AP Professional, 1993.

³⁷ Nielsen, Jakob, and Robert L. Mack. *Usability Inspection Methods*. New York: John Wiley & Sons, Inc., 1994.

Debriefing:

- Ask user for comments about the system or suggested changes.
- Observer can ask questions to clarify observations.

Using these guidelines, a usability study was designed to test the Ackland's new interface.

6.1 - Methodology

The usability test consisted of 16 tasks³⁸ the participants were asked to complete using the interface developed to access the Ackland Art Museum's collection database. The instructions³⁹ were included with the tasks so that all participants received the same information. The URL for the interface was provided in the instructions, but no additional resources were provided to aid the user in the test.

At the beginning of each test, the researcher explained the purpose of the test and how the test would work. The participants were given the instructions to read and asked if they had any questions. The instructions requested the participants to think aloud to aid the researcher's observations. Once participants were clear on the procedures, the participants were given the instructions one-by-one printed on individual sheets of paper as recommended in the usability test guidelines. The researcher observed the participants and took notes on the participants' comments and actions, but refrained from interacting with the participants as much as possible.

The study was conducted at the Ackland Art Museum; either in the offices of the participating staff members, or in the Museum's conference room in the case of the one patron participating in the study. It took approximately 45 minutes for participants to complete and was conducted over a three day period, March 17th to 19th, 2004.

There were six participants, three male and three female, over the age of 18. Five of the subjects were members of the Museum staff and one was a patron of the Museum. The staff participants in this study were selected from among the group who participated in the user needs assessment and paper prototype reviews. The number of staff participants was narrowed from eight to five because it is generally agreed that three to five participants will give enough information to find the majority of problems in a usability test.

The sixth participant was a patron of the Ackland Art Museum. Initially, input was not going to be gathered from the Museum's patrons during the usability test, but during an earlier survey to learn more about the Ackland's patrons, one of the participants volunteered for an interview. Since this patron was available and willing to participate, he was included to provide at least minimal input from the patrons who will be frequent users of the new system.

³⁸ Appendix J.

³⁹ Appendix I.

All of the participants performed the tests on an individual basis except for the two educators who performed the usability test together. This repeated the procedure used in the paper prototype reviews, and provided more feedback on their thoughts as they interacted with the system.

It should be noted that a limitation of this study was that the staff participants had some experience with the system due to the paper prototype reviews. The inclusion of the patron helped off-set the problem because he was completely unfamiliar with the interface.

This study was approved by the Academic Affairs Institute Review Board. Consent to participate in the study was obtained at the beginning of each test by providing participants with a written consent statement to read and agree to orally.

6.2 - Explanation of Tasks

Following is a description of the usability study tasks used to evaluate the interface and an explanation of why each task was chosen.

Task 1: Find all works of art by artist Ansel Adams.

The first task served two purposes: it was designed to be easy to perform to help build the users' confidence and give them a chance to become familiar with the interface, and it was designed to test the artist search feature on the simple search form.

Task 2: Find the work of art entitled Peaches.

This task was used to test the title search feature on the simple search page.

Task 3: Find all works of art in the category Decorative Arts.

This task was used to test the category search feature on the simple search page and to elicit feedback on the use of the category field instead of the medium field. Additionally, it was used to see if users had trouble using the drop down lists.

Task 4: Find all works of art made by the culture American.

This task was used to test the culture search feature on the simple search page. Additionally, since this list consisted of a condensed set of keywords derived from the database, this task was used to elicit feedback on the keywords included in the list.

Task 5: Use the Simple Search feature to find all works of art made by artist Ansel Adams that have an image.

This task was designed to test the checkbox used to limit the search results to only those records in the database that have images. (When this instrument was designed, it was assumed the interface would be returning all records meeting the search criteria by default and would only limit the results to records with images when the user specifically requested it to. Since the interface was only returning records with images at the time of this study, users were told at the beginning of the study of this limitation, but were still asked to perform this task to see if they understood how to make the functionality work.)

Task 6: Using the Advanced Search feature, find all the works of art by an artist of your choice in a specific category of your choice.

Task 6 was designed to test the advanced search feature to see if users would understand how to use the drop down boxes to determine which fields in the database would be searched.

Task 7: Performing only one search, find all works of art in category Book and all works of art in category Sculpture.

Task 7 is very similar to Task 6 and was included for two reasons. First, it ensured the users understood that they determined which fields in the database would be searched based on the values they selected in the drop down list. Second, it was hoped users would comment on the usefulness of the tool and if they found the tool helpful or cumbersome.

Tasks 8-12 were designed to test the navigation of the search results page and the item details page.

Task 8: View records 11-20.

After performing Task 7, the user's location in the system was the search results page. Task 8 was designed to test the "next page" feature on the search results navigation bar.

Task 9: View the last record in the search results.

This task was designed to test the "last page" feature on the search results navigation bar.

Task 10: View the details of the last record in the search results.

This task was designed to test the links provided to reach the details page. Users could get to this page either by clicking on the image of the object or on the link labeled "Details" listed under the descriptive information for each object.

Task 11: Return to the search results.

After completing Task 10, users were located on the details page of the system. Task 11 was used to test the "Search Results" link to return the users to the search results page.

Task 12: Use the New Search hyperlink to begin a new search.

After completing Task 11, users were once again located on the search results page. Task 12 tested the "New Search" link provided on the search results page used to return users to either the simple search form or the advanced search form depending on where they first initiated the search.

Task 13: Find all works of art made between 600 BCE and 200 CE.

Task 13 was used to test the date search feature, including how to search for objects dated B.C.E. It should be noted that the date search feature was not functional at the time of the usability test and users were informed of this fact. They were still asked to perform the task to ensure they could enter the search terms correctly.

Task 14: Show the list of artists whose last name begins with 'C'.

This task was designed to test one of the keyword term lists provided to assist users in becoming familiar with the collection. The artist name list was used to see if users would understand the letter grid provided to divide up the list according to the first letter in the artists' last name.

Task 15: Locate the instructions on performing an advanced search.

This task was designed to see if users could easily locate the help page for the search interface.

Task 16: Return to the Ackland home page.

This task was designed to test the links to leave the search interface section of the Ackland website and also give the users an easy task to conclude with.

6.3 - Results

The purpose of this study was to determine if users could use the interface in the manner in which it was designed to work and to locate any problems the users had while interacting with the interface. Additionally, the study was designed to give users a chance to comment on what they liked and disliked about the interface and what changes they would like to see made during the revisions to the system.

The structure of this study meant the data gathered was qualitative rather than quantitative. Since the users were not being asked to compare the interface to another system, numeric measures would not really have any meaning.

The success or failure of an individual task was measured by the user's ability to complete the task. The rationale behind this decision was the assumption that since the tasks included in the study represented the functions that would be performed when the system is in production, if users could successfully perform these functions, then the interface fulfilled the requirement that it be easy to use.

How well users like the system was measured by their comments while performing the tasks and during the debriefing period at which time they were asked if they liked the system and if there were features they would like to have added, changed or altogether removed.

The first task was supposed to be easy: retrieve the records in the database for the artist Ansel Adams. However, this turned out not be as straightforward as it was intended to be because the interface had not yet been configured to search the database in "first name last name" order. The artist name is listed in the database as "Adams, Ansel" and in order for users to retrieve his works, they had to pay attention to the instructions on the screen that told them how to format the artist name. They also had to pay attention to the instructions that told them the search is case sensitive.

The tasks were designed before the interface was completed, and in retrospect, this was not the best task to start with. The task ended up testing both the artist name search feature and the instructions on how to format the keywords. Half of the users did not

see the instructions and entered the search term as "Ansel Adams" or "adams, ansel" and received a message saying no records were found. Most of these users would have proceeded to the next question, but were informed by the observer that there are two works of art in the database by this artist. These users returned to the simple search form and with the exception of one user, saw the instructions and followed them correctly.

This task revealed several problems with the interface. First, the instructions on how to format the artist name search are not prominent enough. Second, the search terms need to be case insensitive and finally, based on the comments of the users, they would prefer the search format be in "first name last name" order, not "last name, first name" order. All of these problems were anticipated and were already on the list of problems to be addressed with the next revision.

Task 2 was used to test the title search feature and was successfully performed by all the users except for one who used a lower case "p" for the work entitled Peaches and received no records. This person was a staff member and knew the work was there, so he quickly realized the problem and repeated the search successfully.

This user did comment, as did several others, that they were not certain if all search fields were case sensitive or just artist name since the instructions explaining the searches are case sensitive were located under the artist search form field. This problem will need to be addressed in the upcoming revisions.

The third task, which asked the users to find all the works of art in the Decorative Arts category, was expected to be easy and not really cause any comment. This turned out not to be the case as one user became upset because he thought the category search would enable him to search by medium and it did not. Despite the fact that it was explained to the user why the category field was used instead of the medium field, he continued to comment on this for well over half the study and when he reached Tasks 6 and 7, used to test the advanced search feature, he was even more annoyed because he still could not search by medium. The reason for this design decision was again explained to him, but at this point he stated that if he were using this system for real, he would quit and not continue to use the interface.

After the usability test was completed, the designer discussed the user's reaction with the Registrar and Assistant Registrar and it was decided to return the medium field to the advanced search form. However, there will not be a keyword list of terms available for the medium field because currently the data is just too non-standardized to allow for this and implementing a standard list of keywords for the database is a huge undertaking that is not possible for the Museum staff at this time.

The decision to include the medium field on the advanced search was made because this form does not use drop down list, so the lack of a keyword list will not be a problem. The lack of a keyword list is the reason the simple search form will continue to only support searching by category. Since the advanced search is strictly a free text type search, it was decided that there was no significant reason not to make the field available and let users try their luck with it. A note will need to be added to the help

page that data in the medium field is very non-standardized, the results will not necessarily be accurate and users may have to try several different search terms to find all the desired records.

All the other users completed the category search successfully, but one user did ask what was represented by the term "category". Combined with the reaction from the other user, the results of this task seem to indicate that a definition will be needed for the term category.

Task 4 tested the culture search on the simple search form with the goal of ensuring the users encountered no problems with the feature, and also to see if the participants had any comments on the keywords included in the list. Only one user questioned the list. The search term used in this task was "American" and the user asked if the list distinguished between American and Native American. It was suggested by the researcher that he scroll down the list and see if there was an entry for Native American, but the user chose not to do so without stating why. The keyword Native American is in the list, but this comment does highlight the issue that culture can be a very sensitive subject which may eventually lead to a situation where a patron becomes upset because a term is or is not in the list. The problem is outside the scope of this project and will need to be handled on a case by case basis with the museum curator who is responsible for the terms used in the database.

It does, however, emphasize the importance of providing a means by which users can communicate with Museum staff. At present, the interface has two hyperlinks to contact the museum which should adequately address this need.

Task 5 asked the users to limit the search results to only those records that have images. All but one of the users successfully located and used the check box to perform this task. No changes to the interface were suggested based on this task.

Task 6 asked the participants to use the advanced search feature to perform a search on the database fields artist and category. Several problems arose from this task. First, some users forgot to use the drop down list to select the fields artist and category. The problem was not unexpected and given that several users had problems with this, a script will be added to check that any keyword form fields that have a search term entered in them will also have a value selected in the database field drop down list.

Another problem that occurred with this task was that one person used the search term "glass" in the category search, which is a medium and not a category. This was particularly awkward given that the person was an expert who would be expected to understand the difference between medium and category better than almost anyone else using the system. This occurrence re-iterates the need to have a definition for the term category as discussed under Task 3.

Task 6 also produced a completely unexpected problem. Two of the users tried to search for artist names that they knew were in the database, but are spelled using diacritics (i.e., accent marks). In both of these cases, the searches failed. Even when one user included the diacritic in the search term, the web browser dropped the accent

mark. There are several scripting functions that can be used to fix this problem and this correction has been added to the list of revisions.

A problem that arose both in Task 6 and Task 7 was that users were confused by the system's use of the Boolean operator "OR" on the advanced search. This provided the opportunity to discuss the appropriateness of the decision to have the advanced search query use the "OR" operator. The users agreed this design decision made sense, but should be explained to the users on the advanced search page and not just on the help page where the explanation is currently located.

Task 7 raised an additional issue related to the search results page. Task 7 asked the users to perform a search to return all items in the book and sculpture categories. However, when users reached the results page, the results were in order by accession number and the descriptive information on this page did not include the object's category. This is not a significant problem for records with images because users can look at the object and tell if it is a book or a sculpture, but it is a problem for objects that do not have an image.

At the time of the usability test, the interface only included the artist name and title of the work to economize on the space for displaying search results. This has since been changed and the search results page now includes culture and category as well. Also, the order of the search results was changed from accession number to artist last name, which, based on user comments, seems to be a more intuitive order.

One final comment that arose during Task 7 was that one user would really like to know which objects in the database are on display in the Museum. This topic was addressed early in the project with the staff, but the designer thought this was not an option because the Registrar's office did not have time to keep the database up-to-date in relation to objects on display. However, the Registrar's staff overheard the participant's comment and indicated that this information is maintained in the database and is updated on a monthly basis. Since the information is available, future revisions to the interface will include showing which objects are on display.

Tasks 8 and 9 asked participants to use the "Next" and "Last" buttons on the search results pages, which caused no problems. Task 10 asked users to view the details for the last record in the search results and Task 11 asked the participants to return to the search results page. Neither of these tasks caused a problem. Participants also did not encounter any problems completing Task 12 which asked the users to begin a new search. Users commented during the tasks relating to the navigation that they really liked the navigation provided to maneuver within the search result set and between the search results, result details and enlarged image view pages.

Task 13 asked users to perform a date search using the advanced search form. All the users entered the search term correctly and used the "B.C.E." check box correctly, but since the date search was not functional, it was not possible to determine if the results would have been what the users expected.

Task 14 tested the artist name keyword list provided on the left navigation bar to help users become familiar with the collection. All the users successfully performed this task, but one person wanted to know how many artists there are for each group (divided up according to the first letter of the artist last name). For example, this task asked the users to show the list of artists whose last name begins with the letter "C". The participant wanted the page displaying the list to show how many artists were included. This request was added to the list of revisions.

Task 15 was included to ensure users could locate the instructions on the help page. All the users successfully completed this task, but several users spent a few seconds examining the advanced search page looking for the instructions before they saw the "Help" link on the left navigation bar. These users suggested a link be included on the simple search page and advanced search page in addition to the link on the left navigation bar. This request was added to the list of revisions.

The last task asked the participants to return to the Ackland home page and was successfully performed by all users.

At the conclusion of each test, the participants were asked their overall opinion of the interface. The Ackland staff were all thrilled and all claimed they really liked the interface. The patron was very unhappy with the system because he could not search by medium, the search results page did not include enough descriptive information about the objects and the search results were ordered by accession number rather than artist last name. It was not clear if this participant completely disliked the interface, or if he thought it would be a good interface with a few minor changes.

The reason for noting the patron was the participant most critical of the interface is that he was the participant who had had the least amount of interaction with the system designer who was conducting the usability test. It is not known if the Ackland staff refrained from being more critical because of the relationships that had been established over the nine months the designer worked on the project. To address this issue, and to thoroughly test the interface more, additional evaluation of the interface will be included in the list of future recommendations for the system.

7. RECOMMENDATIONS FOR THE FUTURE

The usability test concluded the initial development phase for the Ackland's Internet interface to search their collection database, but a new version, based on the usability tests, is in the works. In addition to the revisions, a list of recommendations for future enhancements, discussed below, will be provided to the Ackland Art Museum staff.

First, more usability testing needs to be conducted to identify any additional problems with the interface. It is important to do more research and user testing to determine if the queries on the simple search and advanced search features work in a manner that supports the users' needs. This should include a review of how the Boolean AND and OR operators are used and the use of the wildcards automatically appended to the search terms.

The Museum staff may also want to investigate how the search interface could be utilized by educators. The user needs assessment survey conducted with the Ackland's patrons indicated that educators are not a significant percentage of the users and that using the search interface for classroom assignments was not a high priority. If these findings are correct, the museum may wish to seek ways to increase the interface's usefulness to the educator population, especially given that the museum routinely conducts tours for students in the physical museum.

The existing browse feature represented by the static web pages in the Work of Arts section on the Ackland's existing web site needs to be expanded. At some point, this expansion should include making the browse feature dynamic, so the records displayed on the browse feature would be retrieved from the database to allow the entire collection to be accessed through the use of the browse feature. In order for this to happen, the data in the database will first need to be standardized, especially the artist name, date and culture fields. Once the data is standardized, the browse feature on the interface could be changed to work in the manner of the Tate Museums' browse feature, which was the preference indicated during the staff user need assessment.

Another feature the Registrar's office would like to see implemented is a link on the search details page allowing users to request a copy of the image. This would help streamline the process of filling users' requests for images.

Some final features the Museum may consider adding in the future come from the user needs assessment conducted with the patrons. Below is the list of enhancements with the percentage of participants interested in the feature.

- High resolution images (76%)
- 360 degree view of objects (71%)
- Zoom capability (69%)
- Videos of gallery walk-thrus, lectures, etc. (61%)
- Side-by-side image comparison (61%)
- Links to related materials such as catalog entries (61%)
- Sound clips of music, gallery talks, lectures, etc. (57%)
- Ability to save searches (41%)
- Other (Add reviews, search on content theme, (8%)
artistic movement, list objects on display, archive static web pages about special exhibits)

A final issue that needs to be addressed, and which is certainly not the least important, is how the search interface web pages will be maintained on a long-term basis.

8. CONCLUDING REMARKS

The content of this paper has focused on one specific interface, but the problems encountered during the project and the solutions proposed to address them may benefit the community of small and medium sized museums as they seek new technology to use in their efforts to fulfill their mission of bringing people and art together.

This paper has addressed some of the barriers that may impede museums as they undergo the process of implementing an Internet interface.

- The time and expense to create and maintain the interface including the personnel, hardware and software.
- The knowledge needed both in terms of learning about the user community and their needs, and the personnel knowledge to build a system to meet these needs.
- The data integrity issues of formatting years' worth of data to meet the needs of the new system, but still support the other applications that use the data.

The solutions focused on in this project did not use sophisticated technology, thus making them more feasible for small and medium sized museums with limited funding.

Finally, the results of the survey conducted with the Ackland Art Museum patrons indicate that museum visitors are interested in virtual museums and hopefully this study and ones like it, can be used to increase the funding provided to small and medium sized museums to provide these services.

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APPENDICES

APPENDIX A - ONLINE COLLECTIONS USER SURVEY

1. Please indicate your involvement with the Ackland Art Museum. (*Select all that apply*)
 - UNC University member (faculty, staff, student, other)
 - Ackland Art Museum member
 - Frequent visitor
 - Infrequent visitor
 - Online visitor
 - Other: _____

2. Please check the terms that apply to you. (*Select all that apply*)
 - Visual artist
 - Art historian
 - Collector
 - University faculty
 - K-12 teacher
 - Museum professional
 - Independent scholar
 - Student
 - General public
 - Retired
 - Other: _____

3. What is the highest level of education you have completed?
 - Less than a high school diploma
 - High school graduate, no college
 - Some college or associates degree
 - Bachelors degree or higher

4. What is your comfort level with computers?
 - Very comfortable
 - Somewhat comfortable
 - Somewhat uncomfortable
 - Very uncomfortable

5. If you were using the Internet to access the Ackland Art Museum's website, where would you connect from most often?
 - School
 - Library
 - Work
 - Home
 - Other: _____

6. If connecting to the Internet from home, what best describes your connection?
 - Dial-up modem
 - High speed cable/DSL
 - Not sure

APPENDIX A CONTINUED

7. How do you prefer to look for information on the Internet? (Select all that apply)
- Browse list of hyperlinks (i.e. Yahoo like search)
 - Search by selecting from a list of terms (i.e. Drop down lists)
 - Search using your own words (i.e. Google like search)
 - Do not currently use the Internet to search for information
8. If the Ackland were to make its collection available on-line through images of objects with descriptive information including title, maker, medium, date and culture, do you think you would use it?
- Yes
 - No
 - Not sure: _____
9. If yes, please indicate the ways in which you would use the collection. (*Select all that apply*)
- General browsing
 - Image acquisition
 - Classroom material/lesson plan (teachers)
 - Classroom material/assignment (students)
 - Research: Discovery
 - Research: Fact Checking
 - Preparation for a visit
 - Other: _____
10. For future expansion, what other features would you like to have available for searching the Ackland collection online? (*Select all that apply*)
- Videos of gallery walk-thrus, lectures, etc.
 - High resolution images
 - Zoom capability
 - 360 degree view of objects
 - Sound clips of music, gallery talks, lectures, etc.
 - Side-by-side image comparison
 - Links to related materials such as catalog entries
 - Ability to save searches
 - Other: _____
11. Do you have any additional suggestions for how the Ackland could meet your online information needs?

--

APPENDIX B - ONLINE COLLECTIONS USER SURVEY RESULTS

1. Please indicate your involvement with the Ackland Art Museum. (*Select all that apply*)

	TOTAL
Infrequent visitor [d]	50 (56%)
Online visitor [e]	42 (47%)
Ackland Art Museum member [b]	37 (41%)
Frequent visitor [c]	34 (38%)
UNC University member (faculty, staff, student, other) [a]	27 (30%)
Other [f]	23 (26%)

2. Please check the terms that apply to you. (*Select all that apply*)

	TOTAL
General public [i]	62 (69%)
Retired [j]	30 (33%)
Visual artist [a]	26 (29%)
Collector [c]	20 (22%)
Art historian [b]	17 (19%)
Independent scholar [g]	13 (14%)
Student [h]	13 (14%)
Museum professional [f]	12 (13%)
University faculty [d]	11 (12%)
Other [k]	9 (10%)
K-12 teacher [e]	6 (7%)

3. What is the highest level of education you have completed?

	TOTAL	COMPLETE	INCOMPLETE
Less than a high school diploma	0 (0%)	0 (0%)	0 (0%)
High school graduate, no college		1 (4%)	-
Some college or associates degree		2 (8%)	-
Bachelors degree or higher		23 (88%)	-
<i>Missing</i>		0 (0%)	64 (100%)

4. What is your comfort level with computers?

	TOTAL	COMPLETE	INCOMPLETE
Very comfortable	62 (69%)	14 (54%)	48 (75%)
Somewhat comfortable		10 (38%)	-
Somewhat uncomfortable		1 (4%)	-
Very uncomfortable		0 (0%)	-
<i>Missing</i>		1 (4%)	16 (25%)

5. If you were using the Internet to access the Ackland Art Museum's website, where would you connect from most often?

	TOTAL	COMPLETE	INCOMPLETE
School	5 (6%)	3 (12%)	2 (3%)
Library		1 (4%)	-
Work		3 (12%)	-
Home		19 (73%)	-
Other		0 (0%)	-
<i>Missing</i>		0 (0%)	62 (97%)

APPENDIX B CONTINUED

6. If connecting to the Internet from home, what best describes your connection?

	TOTAL	COMPLETE	INCOMPLETE
Dial-up modem	34 (38%)	11 (42%)	23 (36%)
High speed cable/DSL		11 (42%)	-
Not sure		2 (8%)	-
<i>Missing</i>		2 (8%)	41 (64%)

7. How do you prefer to look for information on the Internet? (Select all that apply)

	TOTAL
Search using your own words (i.e. Google like search) [c]	80 (89%)
Browse list of hyperlinks (i.e. Yahoo like search) [a]	35 (39%)
Search by selecting from a list of terms (i.e. Drop down lists) [b]	31 (34%)
Do not currently use the Internet to search for information [d]	1 (1%)

8. If the Ackland were to make its collection available on-line through images of objects with descriptive information including title, maker, medium, date and culture, do you think you would use it?

	TOTAL	COMPLETE	INCOMPLETE
Yes	66 (73%)	20 (77%)	46 (72%)
No		2 (8%)	-
Not sure		3 (12%)	-
<i>Missing</i>		1 (4%)	18 (28%)

9. If yes, please indicate the ways in which you would use the collection. (
- Select all that apply*
-)

	TOTAL
General browsing [a]	68 (76%)
Preparation for a visit [g]	53 (59%)
Image acquisition [b]	35 (39%)
Research: Discovery [e]	33 (37%)
Research: Fact Checking [f]	33 (37%)
Classroom material/lesson plan (teachers) [c]	21 (23%)
Classroom material/assignment (students) [d]	7 (6%)
Other [h]	7 (6%)

10. For future expansion, what other features would you like to have available for searching the Ackland collection online? (
- Select all that apply*
-)

	TOTAL
High resolution images [b]	68 (76%)
360 degree view of objects [d]	64 (71%)
Zoom capability [c]	62 (69%)
Videos of gallery walk-thrus, lectures, etc. [a]	55 (61%)
Side-by-side image comparison [f]	55 (61%)
Links to related materials such as catalog entries [g]	55 (61%)
Sound clips of music, gallery talks, lectures, etc. [e]	51 (57%)
Ability to save searches [h]	37 (41%)
Other [i]	7 (8%)

APPENDIX B CONTINUEDFree Text Answers

- 1 Other: Please indicate your involvement with the Ackland Art Museum. (*Select all that apply*)
- University consultant
 - UNC-CH Alumnus **(3)**
 - Former volunteer and Ackland employee **(2)**
 - Volunteer **(2)**
 - Guild volunteer **(2)**
 - Guild Board member
 - Volunteer Gallery Teacher **(3)**
 - Spouse of staff member
 - Past Board Member/Ackland Guild/Now Member
 - Docent
 - Docent in training
 - Former docent
 - Recently moved to area - visited for first time
 - Local resident of Chapel Hill
 - First time out-of-town visitor
 - First time visitor
- 2 Other: Please check the terms that apply to you. (*Select all that apply*)
- UNC Staff
 - Community college professor teaching humanities courses involving student museum tours
 - Activity Director - Assisted Living
 - Art Lover
 - Gallery teacher
 - Glass historian; fiber/textile artist
 - Museum docent
 - Art enthusiast
 - Anthropologist, social activist
- 5 Other: If you were using the Internet to access the Ackland Art Museum's website, where would you connect from most often?
- And office
 - School as a teacher, home as a visual artist
- 10 Other: For future expansion, what other features would you like to have available for searching the Ackland collection online?
- The whole collection should be on-line, it is reflects all the hard work you've done.
 - Links to books, articles, objects in other online collections, etc. related to object or genre
 - Links to related stories and narratives
 - Links to like objects and other teaching collections
 - Slide shows of current or past exhibitions
 - Links to/from other museums
11. Additional comments.*
- Allow the public to add their comments to pages, certainly to pages showing art. You can see a model from a technical site that I like here:
<http://www.mysql.com/doc/en/ISAM.html> -- ge@entenman.net
 - continue to list upcoming shows,lectures,events,meet the artist events,etc.

APPENDIX B CONTINUED

Free Text Answers Continued

- All images should be downloadable; dont worry about the Ackland receiving credits or not -- its good publicity regardless of the personal use. Also, remember this is a visual arts museum: images are prime, not sounds.
- Links to other art museum collections.
- Survey from time to time about what art I would like see come to the triangle.
- curatorial text to accompany objects/images; exhibition catalogs online; "reviews" by patrons, professors, students of ongoing exhibits
- Again having the whole collection on-line would be a great goal. It will also help in the mission of education that I feel is part of the Ackland. Thank you.
- References to printed books and catalogs (esp. in Sloane Art Library) would be helpful.
- searching by artist, period, title of work, content of image, and themes--a tall order, but would be very helpful for research and teaching!
- This is a great service to the community. May want to look at other museum sites to gather benchmarks on how they do some of the above.
- Information about the artist along with the art.
- No. Just be sure that whatever you do to "improve" the site doesn't jeopardize the general publics ability to access all the wonderful adventures in art offered at and by the Ackland. TEST: Can it be readily accessed at a public or school library comp
- Be sure that ArtCyclopedia has full information as to works by artists names, nationalities, affiliations with schools and movements, etc. The newly conserved screen should be a model for the completeness of information made available to users of Art
- My interests are focused on my gallery teaching. Id like to be able to access the various learning activities we use in teaching, as well as excellent images of many of the works of art, with links to accompanying information.
- I have been to 2 recent lectures in Hanes Auditorium where the projection equipment either did not work or was woefully inadequate. The on-line ability to view lectures is highly desirable as I will NEVER attend a lecture in that auditorium again. A
- There are many oppotunities that slide by. List lectures at least a month ahead, as well as special shows, including the Alcott Gallery.
- As a resource for programs I cannot attend. The suggestions above concerning the use of videos or sound clips would be most interesting to me.
- It might be helpful to provide current viewing information for particular works, i.e. whether something is currently on view, on loan, or in storage.
- I am a student and enjoy stopping by on my way home.
- Making the collection more online accessible would be great. I encourage this project and will use it for my personal use and my teaching. Thanks!
- Have some specialty items for elementary and middle school children to get them excited about visiting and experiencing the Ackland.

*Participants were limited to 250 characters, some responses were truncated by the database.

APPENDIX C - STAFF TECHNOLOGY USE SURVEY

Please answer the following questions by circling the appropriate letter.

1. What is your comfort level with computers?
 - a. Very comfortable
 - b. Somewhat comfortable
 - c. Somewhat uncomfortable
 - d. Very uncomfortable

2. How do you prefer to look for information on the Internet? *(Select all that apply)*
 - a. Browse list of hyperlinks (i.e. Yahoo like search)
 - b. Search by selecting from a list of terms (i.e. Drop down lists)
 - c. Search using your own words (i.e. Google like search)
 - d. Do not currently use the Internet to search for information

3. Have you previously used the Internet to search an image database?
 - a. Yes
 - b. No
 - c. Not sure: _____

If you answered yes to question 3, please answer the following questions:

4. What was the nature of your search? *(Select all that apply)*
 - a. General interest
 - b. Work related
 - c. Other: _____

5. Was the purpose of your search: *(Select all that apply)*
 - a. To find a specific object
 - b. Just browsing.

6. Was the image database part of a museum collection?
 - a. Yes
 - b. No
 - c. Not sure: _____

Additional comments on searching on-line image databases.

APPENDIX D - MUSEUM INTERFACE COMPARISON INSTRUCTIONS

MUSEUM INTERFACE COMPARISON INSTRUCTIONS

The following exercise is designed to compare the search interfaces of two on-line museum image collections, the Peabody Museum of Archaeology and Ethnography and the Tate Museum. This exercise is comprised of the series of tasks listed below. To complete this exercise, use the links provided to open the search pages, and then complete each task in the order in which they appear. For the tasks with time limits, the observer will inform you when the allotted amount of time has passed.

During the exercise, you will be observed only to determine how easy or difficulty you find the interfaces to use to complete the tasks. *While performing the tasks, please speak aloud;* this is to aid the observer in determining what you are thinking as you search the sites.

The purpose of this exercise is to test the museum search interfaces, not you! Please feel free to ask the facilitator for assistance if any of these instructions are confusing.

APPENDIX D CONTINUED**MUSEUM INTERFACE COMPARISON EXERCISE [Begin with Peabody]**PART A

1. Using this URL, open the main page for the Peabody Museum:
<http://www.peabody.harvard.edu/default.html>
2. Search for images of interest for 5 minutes.
3. Try to perform a search to return only the records for masks and carvings created by the artist/maker Buzi.
4. Leaving the Peabody website open, use this URL to open the main page for the Tate Museum in a new browser window: <http://www.tate.org.uk/home/default.htm>
5. Search for images of interest for 5 minutes.
6. Try to perform a search to return only the records for sculptures and on paper prints created by the artist Gabo.

PART B

1. Read the "Peabody Museum Interface Evaluation Questionnaire" provided by the interview facilitator.
2. Return to the Peabody Museum website.
3. Perform a search for objects of interest using the "Browse Selection" feature.
4. View the details for an object of interest.
5. Return to the search results.
6. Begin a new search.
7. Click on the label "Perform a Search" and then click on the "Where" label. Click on the letter "M". Note the list of items to the right of the search box.
8. Click on the label "Perform a Search" and then click on the "Who" label. Click on the letter "M". Click on an item in the list to the right of the search box and then click Find.
9. Evaluate the Peabody Museum website using the "Museum Interface Evaluation Survey."

PART C

1. Read the "Tate Museum Interface Evaluation Questionnaire" provided by the interview facilitator.
2. Return to the Tate Museum website.
3. Perform a search for objects of interest using the "Subject Search" feature.
4. View the details for an object of interest.
5. Return to the search results.
6. Begin a new search.
7. Click on the label "Artist List" and then click on the letter "M". Click on a name of your choice.
8. Evaluate the Tate Museum website using the "Museum Interface Evaluation Survey."

APPENDIX D CONTINUED***MUSEUM INTERFACE COMPARISON EXERCISE [Begin with Tate]***PART A

1. Using this URL, open the main page for the Tate Museum:
<http://www.tate.org.uk/home/default.htm>
2. Search for images of interest for 5 minutes.
3. Try to perform a search to return only the records for sculptures and on paper prints created by the artist Gabo.
4. Leaving the Tate website open, use this URL to open the main page for the Peabody Museum in a new browser window: <http://www.peabody.harvard.edu/default.html>
5. Search for images of interest for 5 minutes.
6. Try to perform a search to return only the records for masks and carvings created by the artist/maker Buzi.

PART B

1. Read the "Tate Museum Interface Evaluation Questionnaire" provided by the interview facilitator.
2. Return to the Tate Museum website.
3. Perform a search for objects of interest using the "Subject Search" feature.
4. View the details for an object of interest.
5. Return to the search results.
6. Begin a new search.
7. Click on the label "Artist List" and then click on the letter "M". Click on a name of your choice.
8. Evaluate the Tate Museum website using the "Museum Interface Evaluation Survey."

PART C

1. Read the "Peabody Museum Interface Evaluation Questionnaire" provided by the interview facilitator.
2. Return to the Peabody Museum website.
3. Perform a search for objects of interest using the "Browse Selection" feature.
4. View the details for an object of interest.
5. Return to the search results.
6. Begin a new search.
7. Click on the label "Perform a Search" and then click on the "Where" label. Click on the letter "M". Note the list of items to the right of the search box.
8. Click on the label "Perform a Search" and then click on the "Who" label. Click on the letter "M". Click on an item in the list to the right of the search box and then click Find.
9. Evaluate the Peabody Museum website using the "Museum Interface Evaluation Survey."

APPENDIX E – MUSEUM INTERFACE COMPARISON SURVEY

PEABODY MUSEUM INTERFACE COMPARISON SURVEY

Complete the evaluation by placing an "X" in the box most closely representing your opinion.

	STRONGLY DISAGREE		NEITHER			STRONGLY AGREE	
	1	2	3	4	5	6	7
It was easy to find the search pages from the museum home page.							
It was easy to navigate the search pages using the links provided.							
While performing the assigned tasks it was easy to begin a new search.							
Overall, I found the layout of the pages, the text and graphics pleasing.							
It was clear the labels "who, what, where" represented the database fields artist/maker, medium and culture.							
I found the lists of terms available by clicking on the labels "who, what, where" were helpful in becoming familiar with the collection.							
I found the categories on the Browse feature helpful in becoming familiar with the collection.							
My searches were successful when I used the Browse feature.							
My searches were successful when I used the Simple Search feature.							
My searches were successful when I used the Advanced Search feature							
I found the Boolean operators "and" & "or" helpful in narrowing my searches on the Advanced Search feature.							
The number of times my searches returned no results was limited.							
For future searches I would use the Browse feature again.							
For future searches I would use the Simple Search feature again.							
For future searches I would use the Advanced Search feature again.							
Overall, I was pleased with this search tool.							

Please comment on the overall design of the pages, the ease of navigation and the labels used to identify objects: _____

Please comment on the Browse, Simple Search and Advanced Search features: _____

APPENDIX E CONTINUED**TATE MUSEUM INTERFACE COMPARISON SURVEY**

Complete the evaluation by placing an "X" in the box most closely representing your opinion.

	STRONGLY DISAGREE		NEITHER			STRONGLY AGREE	
	1	2	3	4	5	6	7
It was easy to find the search pages from the museum home page.							
It was easy to navigate the search pages using the links provided.							
While performing the assigned tasks it was easy to begin a new search.							
Overall, I found the layout of the pages, the text and graphics pleasing.							
I found the list of artists in the "Artist List" helpful in becoming familiar with the collection.							
I found the categories on the Browse feature (Subject Search) helpful in becoming familiar with the collection.							
My searches were successful when I used the Browse feature.							
My searches were successful when I used the Simple Search feature.							
My searches were successful when I used the Full (Advanced) Search feature							
The number of times my searches returned no results was limited.							
I found the Full Search feature provided adequate flexibility to perform advanced searches in the database.							
For future searches I would use the Browse feature again.							
For future searches I would use the Simple Search feature again.							
For future searches I would use the Full Search feature again.							
It was clear what the labels artist name, work title, and object type represented.							
Overall, I was pleased with this search tool.							

Please comment on the overall design of the pages, the ease of navigation and the labels used to identify objects: _____

Please comment on the Browse, Simple Search and Advanced Search features: _____

APPENDIX F - STAFF TECHNOLOGY USE SURVEY RESULTS

Please answer the following questions by circling the appropriate letter.

1. What is your comfort level with computers?

Very comfortable	4
Somewhat comfortable	3
Somewhat uncomfortable	0
Very uncomfortable	0

2. How do you prefer to look for information on the Internet? *(Select all that apply)*

Browse list of hyperlinks (i.e. Yahoo like search)	0
Search by selecting from a list of terms (i.e. Drop down lists)	0
Search using your own words (i.e. Google like search)	7
Do not currently use the Internet to search for information	0

3. Have you previously used the Internet to search an image database?

Yes	7
No	0
Not sure	0

If you answered yes to question 3, please answer the following questions:

4. What was the nature of your search? *(Select all that apply)*

General interest	5
Work related	7
Other	2

4c. Other:

-School related.

-Related to research for a university class.

5. Was the purpose of your search: *(Select all that apply)*

To find a specific object	7
Just browsing.	5

6. Was the image database part of a museum collection?

Yes	6
No	1
Not sure	0

Additional comments on searching on-line image databases

- #5. To find other images by a particular artist or w/historical time period or contextual info related to works.
- I often find with a large image database (museum as opposed to dealer) that I don't know quite where I am or how far the territory stretches in different directions from where I am.

APPENDIX G – MUSEUM INTERFACE COMPARISON SURVEY RESULTS

PEABODY MUSEUM INTERFACE EVALUATION

	STRONGLY DISAGREE		NEITHER			STRONGLY AGREE	
P1. It was easy to find the search pages from the museum home page.		1	1		3	2	
P2. It was easy to navigate the search pages using the links provided.		1	1	1	2	2	
P3. While performing the assigned tasks it was easy to begin a new search.			2		4		1
P4. Overall, I found the layout of the pages, the text and graphics pleasing.			1	1		3	1
P5. It was clear the labels “who, what, where” represented the database fields artist/maker, medium and culture.		1		1	2	1	2
P6. I found the lists of terms available by clicking on the labels “who, what, where” were helpful in becoming familiar with the collection.		1	1	1	1	3	
P7. I found the categories on the Browse feature helpful in becoming familiar with the collection.	1	2		1	1	2	
P8. My searches were successful when I used the Browse feature.			1	1	3	1	1
P9. My searches were successful when I used the Simple Search feature.				1	2	2	2
P10. My searches were successful when I used the Advanced Search feature	1	2	1		1	1	1
P11. I found the Boolean operators “and” & “or” helpful in narrowing my searches on the Advanced Search feature.	2	2		2		1	
P12. The number of times my searches returned no results was limited.	1	1	2			2	1
P13. For future searches I would use the Browse feature again.	1	1			1	1	3
P14. For future searches I would use the Simple Search feature again						2	5
P15. For future searches I would use the Advanced Search feature again.		1	1		1	1	3
P16. Overall, I was pleased with this search tool.					3	4	

APPENDIX G CONTINUED

TATE MUSEUM INTERFACE EVALUATION

	STRONGLY DISAGREE		NEITHER		STRONGLY AGREE	
T1. It was easy to find the search pages from the museum home page.			2		3	2
T2. It was easy to navigate the search pages using the links provided.		1			1	4
T3. While performing the assigned tasks it was easy to begin a new search.		1			1	4
T4. Overall, I found the layout of the pages, the text and graphics pleasing.		1	2			2
T5. I found the list of artists in the "Artist List" helpful in becoming familiar with the collection.			2	1	1	
T6. I found the categories on the Browse feature (Subject Search) helpful in becoming familiar with the collection.			1		2	2
T7. My searches were successful when I used the Browse feature.				1	1	1
T8. My searches were successful when I used the Simple Search feature.					1	3
T9. My searches were successful when I used the Advanced Search feature		1	1	1		3
T10. The number of times my searches returned no results was limited.					1	4
T11. I found the Full Search feature provided adequate flexibility to perform advanced searches in the database.		3		1		3
T12. For future searches I would use the Browse feature again.					3	1
T13. For future searches I would use the Simple Search feature again.					2	2
T14. For future searches I would use the Full Search feature again.		1	1	1		1
T15. It was clear what the labels artist name, work title, and object type represented.					1	4
T16. Overall, I was pleased with this search tool.					1	3

APPENDIX G CONTINUED

**MUSEUM INTERFACE COMPARISON RESULTS
COMPARISON BY TASK**

P=Peabody Museum

T=Tate Museum

		STRONGLY DISAGREE		NEITHER		STRONGLY AGREE	
P1. It was easy to find the search pages from the museum home page.		1	1		3	2	
T1.			2		3	2	
P2. It was easy to navigate the search pages using the links provided.		1	1	1	2	2	
T2.		1			1	4	1
P3. While performing the assigned tasks it was easy to begin a new search.			2		4		1
T3.			1		1	4	
P4. Overall, I found the layout of the pages, the text and graphics pleasing.			1	1		3	1
T4.		1	2			2	1
P5. It was clear the labels "who, what, where" represented the database fields artist/maker, medium and culture.		1		1	2	1	2
T15. It was clear what the labels artist name, work title, and object type represented.					1	4	2
P6. I found the lists of terms available by clicking on the labels "who, what, where" were helpful in becoming familiar with the collection.		1	1	1	1	3	
T5. I found the list of artists in the "Artist List" helpful in becoming familiar with the collection.			2	1	1		3
P7. I found the categories on the Browse feature helpful in becoming familiar with the collection.	1	2		1	1	2	
T6. I found the categories on the Browse feature (Subject Search) helpful in becoming familiar with the collection.			1		2	2	2
P8. My searches were successful when I used the Browse feature.			1	1	3	1	1
T7.				1	1	1	4

APPENDIX G CONTINUED

P9. My searches were successful when I used the Simple Search feature.				1	2	2	2
T8.					1	3	3
P10. My searches were successful when I used the Advanced Search feature	1	2	1		1	1	1
T9.		1	1	1		3	1
P11. I found the Boolean operators "and" & "or" helpful in narrowing my searches on the Advanced Search feature.	2	2		2		1	
T11. I found the Full Search feature provided adequate flexibility to perform advanced searches in the database.		3		1		3	
P12. The number of times my searches returned no results was limited.	1	1	2			2	1
T10.					1	4	1
P13. For future searches I would use the Browse feature again.	1	1			1	1	3
T12.					3	1	3
P14. For future searches I would use the Simple Search feature again						2	5
T13.					2	2	3
P15. For future searches I would use the Advanced Search feature again.		1	1		1	1	3
T14.		1	1	1		1	3
P16. Overall, I was pleased with this search tool.					3	4	
T16.					1	3	3

APPENDIX H - PROTOTYPE REVIEW SEMI-STRUCTURED INTERVIEW QUESTIONS

Simple Search

1. How many form fields, either text boxes or drop down lists, should be provided on the simple search?
 - a. If more than one form field, how many fields and which database fields should these search [Artist, title, medium, culture, credit line, accession number, date]?
 - b. If medium and culture are included, should those form fields be drop down lists or text boxes?
2. Include the "Image only" check box so users can return only objects with images in the database?

Advanced Search

1. Should the advanced search have pre-defined form fields for each database field that can be searched (Tate style) or allow the users to assign the database field for each form field using a drop down list (Peabody style)? [Consider flexibility versus ease of use.]
2. Allow users to determine sort order or have the interface do it automatically?
3. Include option to search by date?
 - a. If so, how should it be formatted? [Allow users to enter year or give pre-defined periods?]
 - b. Should the label text read "B.C.E./C.E." or "B.C./A.D."?
4. Include field to search on credit line?
5. Include field to search on accession number?

Browse

1. Use drop down list to display categories or use list of hyperlinks [Yahoo style]? [Other suggestions for layout of the browse page?]
2. Display the number of items in the database corresponding to the category? [For example, if the category "American" has 467 records in the database, display "467" beside the text "American"?

Search Results

1. How many records should be displayed per page? [10 is the usual number]
2. How do we address objects with multiple images?
 - a. Select a primary image that is returned for the object and mark the other images as secondary
 - i. How do we indicate there are secondary images? Link to other images or display them under main image on detail page?
 - b. Return a record for each image?
3. What information should be included on the page with the image? [Artist, culture, title, medium, dimensions, accession number, credit, date of work?]
 - a. Should there be labels beside each field? [Consider that many records in the database have culture stored in the artist name field. It will not always be obvious what information is being displayed.]
4. Is it clear how to reach the details page?
5. Is it clear how to view the first, previous, next and last page in the search results?
6. Is it clear how to begin a new search?
7. Is the layout of the page both functional and aesthetically pleasing?
 - a. Are the navigation aids placed in visible, convenient locations?
 - b. Are additional navigation aids needed?

APPENDIX H CONTINUED

Details

1. What information should be included on the page with the image? [Artist, culture, title, medium, dimensions, accession number, credit, date of work?]
 - a. Should there be labels beside each field? [Refer to item 2a in previous section]
2. Is it clear how to return to the search results page?
3. Is it clear how to view the first, previous, next and last page in the search results?
4. Is it clear how to begin a new search?
5. Is it clear how to view an enlarged version of the image?
6. Is the layout of the page both functional and aesthetically pleasing?
 - a. Are the navigation aids placed in visible, convenient locations?
 - b. Are additional navigation aids needed?
7. Include a printer friendly format?
 - a. Will this present a problem due to copyright restrictions?

Navigation

1. Is it clear how to begin a simple search or an advanced search?
2. Is it clear how to browse the collection?
3. Is it clear how to return to the Ackland home page?
4. Is it clear how to find help on using the search interface?
5. Are the navigation aids placed in visible, convenient locations?

Labels

1. Is the label text clear?
2. Are additional labels needed?

Help

1. What instructions needed to be included on each page and on the main help page?
2. Are the keyword help lists for the fields artist, medium and culture placed in a good location?
3. Should other fields have a keyword help list? [Date, credit line, other suggestions?]
4. Should the keyword help lists use JavaScript to automatically populate the form fields on the search pages?

Overall Page Layout

1. Are the layout of the pages, the text and graphics aesthetically pleasing?

Additional issues to address

1. How will users reach the search pages – what wording will be used for the link?
2. Should there be an introduction page for the search interface or use the simple search as the home page for the search interface?
3. What, if any, copyright notice needs to be displayed?
 - a. On which page(s) should it be included?

APPENDIX I - USABILITY STUDY INSTRUCTIONS

Ackland Art Museum On-line Interface Usability Study

This study is designed to test the usability of the Ackland Art Museum's new On-line Collection interface. The study consists of 16 tasks which will be given to you one at a time by the study administrator. To complete the usability tasks, open an internet browser of your choice and enter the following URL: <http://php.unc.edu/ackland/art/collection/search/SimpleSearch.html>. When you have located the appropriate website, the study administrator will provide you with the first task.

During the test, you will be observed only to determine how easy or difficult you find the interface to use to complete the tasks. **While performing the tasks, please speak aloud;** this is to aid the study administrator in determining what you are thinking as you navigate through the site.

As much as possible, try to complete the tasks without assistance, but feel free to ask for clarification if a task is unclear.

Remember, it is the On-line Collection interface that is being tested, not you!

APPENDIX J - USABILITY STUDY TASKS

Tasks

1. Find all works of art by artist Ansel Adams.
2. Find the work of art entitled Peaches.
3. Find all works of art in the category Decorative Arts.
4. Find all works of art made by culture African.
5. Use the Simple Search feature to find all works of art made by artist Ansel Adams that have an image.
6. Using the Advanced Search feature, find all the works of art by an artist of your choice in a specific category of your choice.
7. Performing only one search, find all works of art in category Book and all works of art in category Sculpture.
8. View records 10-20.
9. View the last record in the search results.
10. View the details of the last record in the search results.
11. Return to the search results.
12. Use the New Search hyperlink to begin a new search.
13. Find all works of art made between 600 BCE and 200 CE.
14. Show the list of artists whose last name begins with 'C'.
15. Locate the instructions on performing an advanced search.
16. Return to the Ackland home page.