A. Introduction

The specific aim of this study was to investigate whether the ISU e-Library website is organized in a way that is easily understood and easily used by ISU students, faculty and staff. Members of the research team for this approved study are Susan A. Vega García, Principal Investigator, and co-principal investigators David Gregory, Maureen Hyland-Carver, and Sunghyun Ryoo Kang.

As stated in our Human Subjects Research Form, good website organization means that typical users of the Library website should be able easily to understand the organization and presentation of the website’s files and resources, as well as understand the various organizing categories and the vocabulary used by the website, such that the typical user is able to use the website easily to find needed information.

The study was conducted in two parts. Part 1 activities included the following:

- Development and posting of a preliminary web questionnaire that was available on the Library’s website (the e-Library), asking e-Library users to provide information regarding their use of and attitudes toward the e-Library. The research team consulted with staff at ISU’s Center for Survey Statistics & Methodology regarding construction of this instrument. Results from the survey were used by the research team to identify key areas of interest to test in the Usability Study.

- Library website usage statistics were examined to identify website sections of high use, as another means of helping the research team construct usability tasks.

- The research team conducted a search of the research and trade literature, consulting other published usability studies and particularly those testing library websites. These studies helped guide the work of the research team.

- The team investigated various software packages, and ultimately decided to acquire Camtasia software to record screen activity and an audio track, in order to gather a complete record of each usability testing session.

- Working with user feedback gathered from the web survey and guidance from the published research, the research team developed a list of eight tasks and a testing protocol by which the usability testing sessions would be conducted. A brief demographic questionnaire was also developed to gather data on user profiles, and a brief post-test questionnaire was developed to gather feedback on user opinions.

- Four undergraduate student participants, all of whom were Library employees, were selected to pilot the task list, the demographic questionnaire, and the testing session protocols. These participants were recruited from positions that do not require nor involve use of the Library’s website. As a result of the pilot testing, both instruments and protocols were refined.
Part 2 activities included actual usability testing, data gathering, and data analysis:

- Fourteen participants were recruited from across the ISU campus, and completed usability testing sessions. These included four undergraduate students; six graduate students; three faculty members; and one Visiting Scientist. Of these participants, eight were female and six were male; in addition, four were non-native speakers of English; one was a native but bilingual speaker of English and another language; and nine were native speakers of English. Participants represented programs from across campus in the sciences, humanities, and social sciences. None of the 14 participants was or had ever been an employee of the ISU Library.

- Usability testing sessions were conducted in a private, enclosed office space free from distraction. A PC with a microphone and Camtasia software installed was used for the testing sessions. Participants were given the option of using IE or Netscape browsers. All users were briefed on the goals of the research project, and informed that their testing sessions would be recorded—both on-screen activity and an audio file—by Camtasia; all participants then signed voluntary informed consent release agreements before any testing was conducted. Participants were asked to complete an optional demographic questionnaire, and then to go through the task list by reading each question out loud to signal the beginning of the task, and to culminate each completed task by stating the correct answer out loud, and then writing it down on the task list. While searching the website, participants were encouraged to “think out loud,” or to provide a narrative of sorts explaining what they were doing and why. Each testing session thus produced a Camtasia visual and aural record, a written record, and the demographic record. After testing, participants were asked to complete an optional post-test questionnaire.

B. Major Findings:

1. **Overview:** Based on success rates, time requirements, observed navigation, and participant comments, participants found the following three questions **relatively easy**:
   - Q1: Library’s open hours on Saturday…
   - Q2: Find call number for book…
   - Q3: Find title of Library 160 tutorial #1…
   All 14 participants completed these tasks in an average time of approximately 1 minute, with the clear majority (12-14) providing accurate responses.

Participants found the next group of questions **somewhat difficult**:
- Q4: Find name of the Nina Ward horse sculpture…
- Q6: Are issues of this journal available online?

Completion/accuracy rates remained high for these questions, but the average time requirement increased to one minute, 45 seconds (1m45s), with several participants struggling in the 2-3 minute zone. For the first time, one participant exceeded 5 minutes for Q4 and another abandoned Q6 after 5m44s.

Participants found the next group of questions **difficult**:
- Q5: Locate book placed on e-reserve…
- Q7: How many books have you checked out?

Completion/accuracy rates dropped for these tasks, and average time required rose to approximately 2m30s. One participant abandoned Q5; two abandoned Q7.

And finally, participants found this last question **extremely difficult**:
Q8: Find a journal article on this topic…

Only two participants completed this task accurately in less than 5 minutes. Only 3 participants began their search in Indexes & Abstracts; the majority began in either the Library Catalog or e-Journals & e-Books.

2. **Participant strategies:** Participants used three basic approaches when looking for information on the e-Library website: Browse (scanning through the website’s information architecture, i.e., the hierarchical structure of categories and terms), Search (using a search tool such as the Library Catalog, Find it!, Site Search, etc.), and Assisted (looking for help or instructions, under How do I..?, Ask a Librarian, Request Forms). Within the Assisted approach, How do I..? was generally successful for participants who used it.

3. **Information architecture:** The website’s information architecture was not intuitive to many participants. In looking for a journal article, for example, participants were obviously confused by COLLECTIONS category names such as e-Journals and e-Books, e-Reference Sources, e-Resources by Subject, and Indexes & Abstracts. Clearly, these names were not immediately understandable to the majority of participants, all of whom had great difficulty with this task. Similarly, in looking for a book on reserve, a few participants perused the various fly-out menu options under CLASSES & TOURS, and browsed through sections entitled Course-related instruction and Instruction Commons, among others. Some participants said they did not expect a book to be on e-Reserve, since it was a book. Some participants looked for Library 160 tutorials under the Workshops & Tutorials category instead of the Library 160 category itself (although there is a link to the Library 160 tutorials on the Workshops & Tutorials page). In ART & EXHIBITS, participants were confused by Parks Library Art, Parks Library Building, and Exhibits, with one participant explaining that an art sculpture in the Library would be “on exhibit” in the building.

4. **Search tools:** Participants were not always clear on the purpose, scope, and functionality of the major e-Library searching tools (Library Catalog, Find it!, indexes and abstracts, e-journal lists). Participants used both the Library Catalog and Find it! as a general all-purpose search engine, for tasks where those tools would not have returned the desired results. Conversely, they failed to use indexes and abstracts where these would have been helpful. Of the participants who utilized the search options on the e-journal lists, half did not understand that the title and subject search there were not implicitly linked with a Boolean “AND.” On a positive note, participants did recognize the Library Catalog as a place to search for a book.

The participants who selected Find It! did not seem to understand its purpose or limitations. For each of the eight questions, one or more participants actually selected Find It! in search of answers. This included: library hours (1 participant); book call number (2); Library 160 tutorial (2); Nina Ward sculpture (2); book on e-Reserve (4); e-journal issue online (2); number of books checked out (3); finding journal article (4). Of these attempts, only one participant successfully found one answer using Find It!, but went overtime on the question. Some users, having accessed Find it!, proceeded immediately to make further selections from the e-Library tabs—perhaps thinking that these represent subdivisions of Find it! Those who did construct potentially viable searches within Find It! seemed confused by the display of search results (e.g., the long delay as targets responded, the repeated screen refreshing, and the lengthy listing of collections at the beginning of the Search Results screen). Finally, some participants voiced frustration at having to login, at the display of search results and the screen refreshing, with the lack of explanation of what Find It! is, and with the name itself.
5. **Expected versus actual paths:** The average success rate of participants following “expected paths” (i.e., paths anticipated by the research team) was 42%, while the average overall success rate (actual paths) was 81%. This shows that participants found information in their own way rather than following the designed model. The average number of clicks by participants following expected paths was 2.75-3, while the average number of clicks by participants in their actual paths was 5.5.

6. **Prior experience and path choice:** Some participants commented that the sheer quantity of resources and options in the e-Library was overwhelming, and that it was not always clear where to go to find the information they needed. Participants also commented after their testing sessions that the Library website was “easy” to use, but only if one already knew where things were located, or which tool(s) to use. Indeed, experience with the sections and tools of the website often seemed to influence where and how usability participants chose to search for information. Some participants habitually would return all the way back to the website home page before beginning their search on a new task, as if they needed to start at the place they usually started in order to find their way. Others selected familiar search tools (such as the Library Catalog) for inappropriate tasks (such as finding Library open hours). Of the eight tasks, never did all the participants select the same initial starting point for the same task, which again points to the participants’ own highly subjective experiences and preferred paths for finding information in the Library website.

A few graduate student and faculty participants commented that they typically would use Google for a particular task (finding articles), rather than the e-Library. If path choice is determined by past experience, clearly a number of users may lack e-Library experience because they are already choosing to use Google for their scholarly information needs rather than a library website. Other graduate student and faculty participants commented that a certain task (e.g., finding articles on a particular topic) was outside their own subject area, and that they would know how to do the task if it were in their own area of expertise, or included in a database they were already familiar with—PubMed, LexisNexis, ABI Inform, ERIC were all mentioned.

7. **Navigation:** Participants most frequently used navigation options at the top and center of the screen (back button, tabs, hyper-links in body text). Participants had a difficult time using navigation on the left side bar when a webpage had a big image or predominant text, even though they had used the side bar in previous tasks. None of the participants clicked on applicable image icons on the context pages though they occupied a prime location. It’s possible that the ambiguity of image icons interfered with navigation.

8. **Terminology:** The outline structure terminology and language used in the e-Library website were clearly not intuitive to usability participants once they were “outside” their realm of past experience. This was most frequently seen in the participants who were non-native or native bilingual speakers of English.

In terms of task completion and accuracy rates, non-native speakers had noticeable difficulties with tasks that included terminology such as “Library hours,” “tutorials,” “sculpture,” “reserve,” “checked out,” and “PIN,” and several of the non-native speakers voiced specific questions about the meaning of some of these words. Further, only non-native/native bilingual speakers of English actually abandoned questions during the usability testing. However, even native speakers of English had difficulty understanding terms such as “reserve,” “e-reserve,” “exhibits,” and the difference between journals and journal articles, and made a number of comments about not knowing the difference between “reserve” and “e-reserve,” and so on.
D. Recommendations

The recommended changes to the e-Library are intended to be part of an iterative process. Changes should be implemented within the website, then re-evaluated through additional usability testing and user feedback, and the cycle repeated. The recommendations below are organized under higher-level concepts and/or somewhat long-term goals, followed by more specific recommendations that could be implemented in the relatively near future.

1. **Participant strategies**: Give equal consideration to all three enduser information-seeking strategies (Browse, Search, Assisted), and make them equally visible/available where appropriate. Make all three strategies more functional and efficient, so that endusers can decipher and utilize them faster.
   
   a. Integrate assistance for finding journal articles throughout the website, including related subcategories such as *Indexes & Abstracts, e-Journals, How do I..?*, etc. Use the website itself to educate users how to find the information they need.
   
   b. Add help messages/links for failed searches to search engine tools (*Library Catalog, Find it!, Site Search*, etc.) where feasible, in order to offer additional suggestions to the enduser.
   
   c. Consolidate the current *Help* and *How do I..?* options, and present only one of these to the enduser.
   
   d. Create a context-sensitive *Help/How do I..?* system, to display appropriate help “just-in-time” to endusers.

2. **Information architecture**: Reorganize the e-Library website, focusing less on how physical libraries are organized (i.e., the architectural/service point model), and more on the task that the enduser is trying to accomplish (e.g., find a book, find a journal article, do something related to a class, learn some piece of information about the library itself, etc.). Focus the website on search tools, interactive services, and actual information resources.
   
   a. Revise the categories and subcategories which participants found confusing and/or overlapping, including electronic resources, course-related material, art.

3. **Search tools**: Increase the coverage and functionality of search engine tools, including the federated search application (currently *Find it!*). Institute a “single-search” option on the e-Library homepage.
   
   a. Replace the current *Site Search* utility with a more comprehensive and granular website index/search tool.
   
   b. Place the basic search engine tools in the e-Library header, using a simple search box with a dropdown list to identify and select the desired tool.

4. **Navigation**: Increase the visibility of navigation options.
   
   a. Sidebar options should be more clearly demarcated, or could be moved up to be an adjunct to the current tab structure.
   
   b. Clarify context page functionality, with a new design format.

5. **Terminology**: In conjunction with the user-centric website reorganization recommended in #2 above, adopt “user information need” nomenclature (e.g., “Find articles”) that focuses on what the user is trying to do or find, instead of using library terminology or other nomenclature that users clearly do not understand (e.g. “*Indexes & Abstracts*”).
a. Define categories/terms for e-Library users on-the-fly, using mouseover tooltips, pop-up boxes, or other means of providing information, definitions, instruction, and context.
b. Remove Reserve & Media Services from the SERVICE AREAS category, and rename e-Reserve in CLASSES & TOURS to the more encompassing Reserve & Media. Add content to former e-Reserve pages to include all Media information as necessary.
c. Rename (and reposition) My Account.

E. Conclusion

As stated earlier, the specific aim of this study was to investigate whether the ISU e-Library website is organized in a way that is easily understood and easily used by ISU students, faculty and staff. Results of this study clearly indicate that improvements are necessary. This study included 14 participants, while website usability experts suggest most problems in a website will be detected by as few as five participants. For this reason, we can consider the results of this study to be accurate and generalizable to an extent. The study shows that most participants could easily locate and successfully use the Library Catalog, but little else. The information architecture and terminology used in the website caused notable difficulties, as did some navigation elements. Finally, the results clearly indicate that the majority of participants do not grasp the purpose or limitations of specific search tools. Listing search tools by type (i.e., “Indexes & Abstracts”) was clearly not meaningful to participants.

This report is being submitted to the e-Library Oversight Committee (eLOC) for review, and the determination of next steps. We are still in the early stages of learning about users’ behavior as they search for information in the e-Library at Iowa State. However, since the time the Usability Study began, some e-Library pages have already been changed in small ways that reflect the research team's recommendations. For example, the context pages for Branch Facilities, How do I..?, and Library Information have been revised to increase the visibility of navigation options. It is expected that the results of this study will be used to further improve the e-Library, with the goal of greatly facilitating its use by our primary clientele. Iteration between web design and usability testing will continue to provide better user experience and services.