Van Houten Library Mobile Website

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INFO 658: Information Architecture

Instructor: Wei Ding

Group Project

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We certify that:

- This project is entirely our own work.
- We have not quoted the words of any other person from a printed source or a website without indicating what has been quoted and providing an appropriate citation.
- We have not submitted this project to satisfy the requirements of any other course.

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1.0 Executive Summary

The New Jersey Institute of Technology (NJIT) offers many technology-oriented programs such as engineering and computer science. The university's library, however, does not yet have a mobile web presence. Meanwhile use of smartphones and mobile web surfing is growing quickly, especially among college-age persons. NJIT's cutting edge reputation must be saved!

Our small design team has stepped up to bring the Robert W. Van Houten library to the university's mobile cyberspace students.

As described in Section 3.0 on page 4, we took time to explore the context of mobile library websites, and learn about the users' needs. We then envisioned potential content that would fit both the context and the users (see Section 4.0 on page 13). Section 5.0 on page 17 describes the information architecture and the features it supports.

Our envisioned website is full-service, providing a range of features commonly used and requested by users of academic library websites. At the same time, the website is tailored to the mobile experience: features are grouped and organized for easy recognition by multi-tasking users with divided attention spans. Selected features are appropriate for a mobile environment. And page elements accommodate the restrictions of small-scale screens.

Over the course of the project, our team learned first-hand about user-centered design. These insights are summarized in Section 6.0 on page 56.

2.0 Problem Statement & Design Goals

The New Jersey Institute of Technology (NJIT) originated as the Newark Technical School in 1881, and has offered college-level classes in North New Jersey since the early 1920's. Today, this public university is comprised of six colleges and offers numerous accredited bachelor's, master's, and doctoral degree programs in fields such as architecture, engineering, and computer science. Roughly six and a half thousand undergrad and three thousand graduate students attend "New Jersey’s science and technology university" (About NJIT, NJIT Office of Strategic Communications, 2011).

NJIT's library, Robert W Van Houten Library (named after a past president), holds 160,000 items in its collection, provides access to over 10,000 journals, and offers multiple databases. The library also has loan agreements with several New Jersey academic libraries. Many of the library's services are technology-oriented, such as the option to borrow software titles, wireless Internet connectivity throughout the building, TeamSpot – an onsite, software-driven collaboration tool, and remote access to the catalog, databases, and inter-library loan through the library's website (New Jersey Institute of Technology).

However, despite NJIT's technology orientation, the Van Houten Library does not yet offer its website in a mobile-formatted version. Meanwhile mobile internet access (i.e. smartphone usage) is growing rapidly, especially among young adults. (Morgan Stanley Research, 2009 , Smith, et al., 2011.).

Since many of the university's students are in the same age group as frequent smartphone users (Smith et al., 2011), we predict that demand for mobile access to university resources will rise.

Therefore our team has elected to design a mobile website for the Van Houten library, so that the library can continue to fully support students' needs.

3.0 Research

A significant portion of our project schedule was devoted to research. Our team's intent was to trace common patterns that would lead to appropriate design choices for the Robert W. Van Houten Library's mobile website. The research was divided into several phases, in which we:

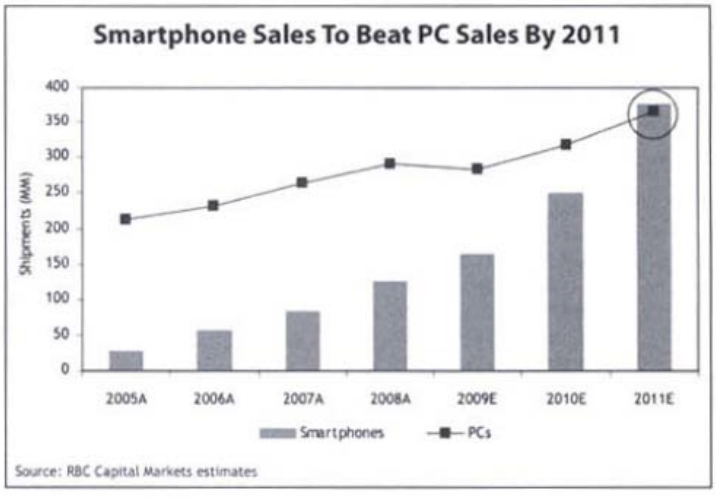
- Reviewed background literature
- Examined existing websites for academic libraries
- Gathered user survey input.

3.1 Background Literature

In the first research phase, our team collected and reviewed literature relating to mobile internet usage trends, library implementations for mobile internet, and mobile internet design recommendations.

3.1.1 Mobile Internet Usage Trends

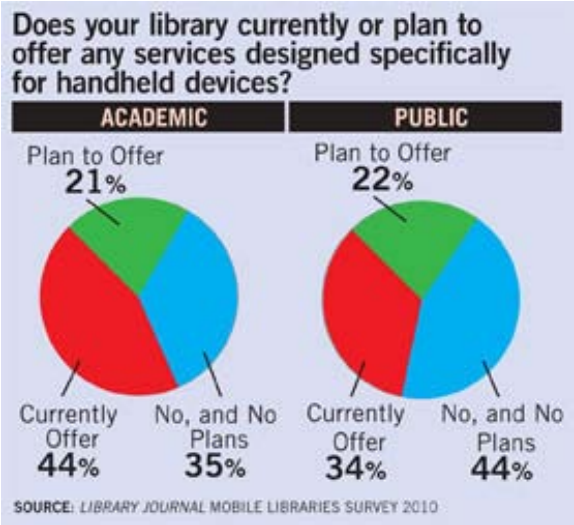
A report by the Pew Foundation states that "32 percent of Americans had accessed the web using a mobile device by April 2009 compared to only 24 percent in December 2007, and 58 percent of 18-29 year olds have used the web on a mobile device" (Aldrich, 2010). This demographic range provides a glimpse of the potential of developing mobile websites for academic libraries. The same Pew report also showed that there was a 13 percent increase from 2009 to 2010 in how many mobile phone owners accessed the Internet (Krishnan, 2011).



Prediction by Dan Former about smartphone sales (Qtd. by Hanson).

3.1.2 Library Implementations for Mobile Internet

A survey conducted in 2010 by the Library Journal provides background about mobile websites for libraries. In this survey involving 483 respondents, "44% of academic libraries and 34% of public libraries currently offer some type of mobile services to their customers" (Thomas, 2010).



Pew Study Mobile Access 2010

According to this survey, some of the most common services included in mobile-friendly library websites included mobile catalogs and SMS reference. On the other hand, according to Thomas, "librarians' attitudes about mobile services vary widely [and are] ranged from disinterested to skeptical" (2010). Their reasoning seems to be well-founded, for the survey revealed that: "mobile access accounts for no more than 6% of total usage of all libraries' mobile websites and catalogs, and no more than 5% for those offering SMS reference services" (Thomas, 2010). Part of the argument for these results is the fact that many users are not aware of this service, but in other instances there was no interest in changing the current system. Regardless, additional studies have been conducted for preferred design of mobile library websites.

3.1.3 Mobile Internet Design Recommendations

In a case study for designing a mobile website for the Greenblatt Library from the Georgia Health Sciences University, Cutshall, et al. summarize some of the key points to consider for a mobile user. In order for a mobile webpage to load efficiently there should be a reduction on the size of graphics. To make content easier to read, the text must be concise and left/right scrolling should be avoided. Another feature that is most appreciated is one-click access, which provides easier navigation for users and "minimize[s] the amount of typing users have to do" (2011, p. 25). Similar to the recommendations made by Cutshall, et al., Aldrich stresses that "mobile websites and apps must display information that can be understood given a short attention span and issues of cognitive load." The features that make the Internet "ubiquitous, such as instant access anywhere, smartphone portability, and increasingly sophisticated apps, make it useful for universities, libraries, and users" (2010) - thus appealing for busy students.

3.2 Review of Existing Websites

This portion of our research was approached from several angles.

- Formal user experience evaluations of several academic library websites (focusing mainly on the full-size websites) provided examples of information architecture approaches and typical website features.
- Data analysis of two sites' Frequently Asked Questions (FAQ) sections gave us insights about the types of questions routinely asked by users.
- Comparison of two libraries' relatively-mature mobile websites provided both feature ideas and design insights.

3.2.1 Formal Website Evaluations

Two pairs of libraries were reviewed and compared. Both the full-sized site and any mobile options were examined.

- Evaluation 1: J.W. England Library: University of the Sciences and Penn Libraries: University of Pennsylvania (Landaverde, 2012).
- Evaluation 2: Robert W Van Houten Library: New Jersey Institute of Technology (NJIT), and University Libraries: University of Washington (UW) (Prieto, 2012).

In both evaluations, the first library is associated with a relatively small, focused university, while the second is a more complex system of libraries for a much larger university.

While labeling varied, the sites offer similar core functions, typically grouped as:

- Direct means of conducting research by searching catalogs and databases, and reviewing various subject guides.
- Supporting services such as inter-library loan and reference, copying, and study rooms.
- Information about the library's availability and policies.
- Online help presented as wikis and FAQs, with one site offering video tutorials.

In terms of organization, the structure of two of the sites seemed to have a more user-conscious design in that categorization was more intuitive and cleanly divided. The organization of the other two sites, while understandable, were less comfortable to navigate and may have grown haphazardly as features were added.

A strong trend found in both evaluations is prominently displayed options for synchronous reference assistance through various channels such as instant message, SMS text, and phone calls. Three sites provide links to this option from multiple pages, displaying it as a unique navigation item within the site's banner or sidebar.

The evaluations also revealed a broad implementation range and significant room for growth in terms of mobile browsing. One site offers multiple single-purpose mobile applications, but does not have a mobile-formatted website. Two others offer a small portion of their site as mobile-formatted. The last site has no mobility options at all.

3.2.2 FAQ Analysis

Penn Libraries FAQ

The Library FAQ (frequently-asked questions list) for the University of Pennsylvania (UPenn) contains 950 total questions pertaining to the library's resources (Penn Libraries, 2002). The questions are divided into four general categories. Policies cover general questions about the library's operation, such as hours, and borrowing privileges. Maps and Directions covers location-based questions about the library as an institution. Reference and Instruction covers questions concerning personal help with research or instruction about library software, including the catalog, databases, and licensed software. Finally, Resource Access covers questions on location of resources themselves, whether electronic or physical, within the library's collection. This includes instructions on location of resources as well as procedures for accessing them. The breakdown of the 950 questions is:

- Policies: 139
- Maps and Directions: 20
- Reference and Instruction: 48
- Resource Access: 743.

As a percentage of the total questions:

- Policies: 14.6%
- Maps and Directions: 2.1%
- Reference and Instruction: 5.1%
- Resource Access: 78.2%.

If considering the FAQ as representative of the community's concerns, access to resources is the dominant area. It should be noted that many of these questions were extremely specific, and included discipline-specific questions, including many very specific business questions. Resource questions are still by far the largest segment of the FAQ, followed by policies, with reference and instruction and maps together accounting for less than 10% of questions.

University of the Sciences FAQ

The University of the Sciences FAQ is very limited in comparison to the UPenn FAQ, with only 35 questions (University of the Sciences, 2011). These questions are actual questions asked by the community, aggregated and tagged. The system is relatively new and therefore has limited questions, but will likely grow. The breakdown of the questions in the same categories as UPenn is:

- Policies: 11
- Maps and Directions: 0
- Reference and Instruction: 4
- Resource Access: 20.

As a percentage of the total questions:

- Policies: 31.4%
- Maps and Directions: 0%
- Reference and Instruction: 11.4%
- Resource Access: 57.2%.

While limited, the distribution of this FAQ reflects the same priorities as the UPenn FAQ. These two FAQs suggest the beginnings of a trend in what patrons are looking for when using a library website.

3.2.3 Mobile Website Samples

Drexel University Libraries

The mobile site for Drexel's library offers a range of interactive and static display functions that seem to cover the full scope of the full-size website. The home page consists of the site title and global navigation buttons – which are also visible on most level pages. These global navigation buttons require careful thought before selection, due to their size and cramped spacing.

On the home page, users may immediately search for books, articles, or databases, view news items, reserve a study room, or initiate reference chat. The current day's operating hours and main telephone are also displayed on the page.

While the Library Chat and search controls are prominent and comfortably large (except for the Books / Articles / Database radio buttons which are difficult to select accurately), the News and Reserve functions are not easily selectable: even though their background color extends across the screen, only the text itself is clickable. The fact that these controls are extremely similar to the non-interactive hours and phone number items also impacts usability.

Despite the hard-to-select radio buttons, the search function does have some positives: the text entry box includes a predictive / type-ahead feature, seemingly based on prior searches. For example, entering "mo" for book search triggered a popup option for "Morville." The results listing for books seems to be scaled for a full size web page rather than a small screen. But the articles results are very readable, as are the database options.

UCF Libraries

In contrast to Drexel University Libraries', the controls on UCF Libraries' mobile site are more consistent and user-friendly, with comfortably-sized selection target areas. The home page is navigation-oriented only, with each major section represented as a full-width horizontal button.

Instead of repeating the global navigation on the inner pages, this site suffices with two persistent options: return to home (by tapping the library name and logo), and Back. This approach avoids the cramped navigation buttons seen on Drexel's site, while allowing users to easily switch to other sections of the site. The extra "tap" needed to return to the home page seems to impose less of a mental load than the careful motor control needed for Drexel's navigation.

In addition to usual catalog / database search and library information, the UCF Libraries site offers some functions that seem particularly user-oriented. The Study Rooms & PCs option displays color-coded visual maps of which resources are currently available. The Locations option (not visible in the image) includes a detailed interior floor plan of the library itself, including a "you are here" feature – very useful for any users who are "lost in the stacks."

3.3 User Survey

After familiarizing ourselves with the overall genre as well as specific website examples, we attempted to learn more about our potential users though a convenience sample survey. The intent was to confirm inferences gleaned from the website evaluations, regarding most favored features, the use of mobile devices to access a library's website, and usability perceptions. We deliberately kept the survey short in hopes of encouraging a higher response rate. The design of the survey was partly modeled after a research study conducted at the Colorado Academic Library (Dickenson, 2006). Most of the questions were closed short-answer, but we offered the opportunity of qualitative feedback via some optional open-ended response choices (e.g. "Other – please specify). In order to assess topic-specific questions, we followed the Colorado research study model which required background information from respondents such as the name of the academic library's website and the respondent's status within the institution.

We published the survey on the SurveyMonkey website. A link to the survey was then posted in a discussion board of a graduate user experience class, and distributed via email to various other individuals, for an approximate total of 33 recipients. While the class consisted of a roughly even mix of library science and information systems students, students' occupations were more varied. These included librarians, web developers, data analysts, a marketing director, a careers counselor, and immigrations paralegal. Recipients of the email-distributed surveys included sociology, child development, and business students, as well as some non-students.

Seventeen responses were received. About three quarters of respondents identified themselves as students, while the remainder selected "Community Member." In terms of tasks commonly

performed on a library website, the most popular were searching the catalog and searching databases, both of which were chosen by 76.5% of respondents. Contrary to expectations based on formal site evaluations (see Section 3.2.1 on page 6), the task of submitting reference questions was chosen by only one person. Moderate-use tasks, ranking at 41.2% and 35.3%, respectively, involved checking information about the library itself, and inter-library loans.

3. What do you do on the website? (check all that apply) Create Chart Download

	Response Percent	Response Count
Submit reference questions.	5.9%	1
Search for books and other materials in the catalog.	76.5%	13
Search for journals and articles in a database.	76.5%	13
Look up hours, policies, or contact information.	41.2%	7
Request digital copies of print materials or inter-library loans.	35.3%	6
Other (please specify) Show Responses	23.5%	4
answered question		17
skipped question		0

The three "Other" responses to the task question (the fourth was just commentary) were:

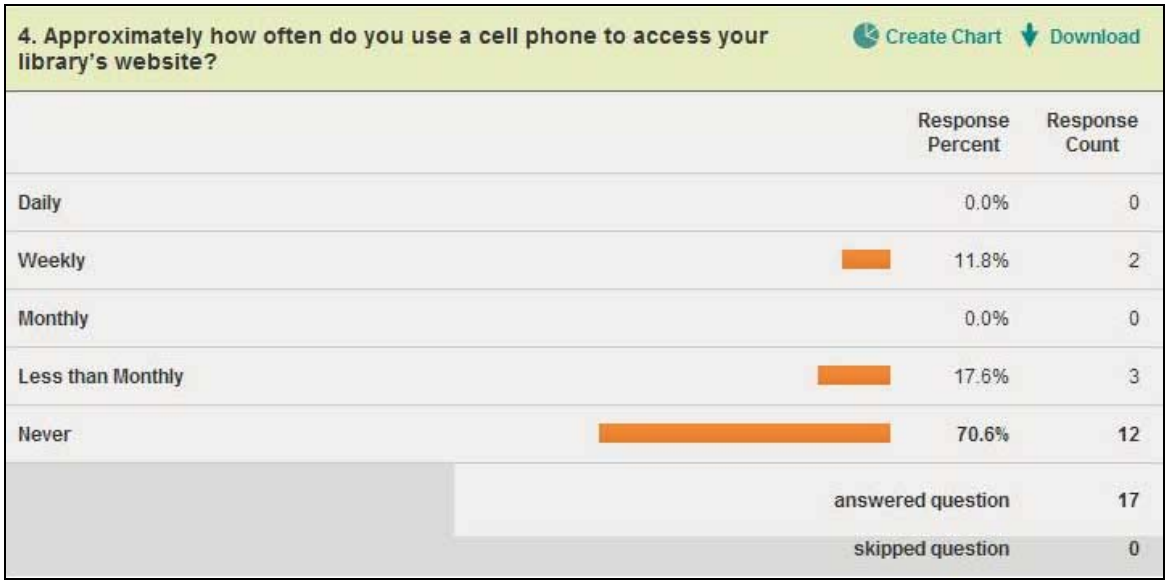
- Access course reserves
- Look for workshops
- Reserve books.

Almost all respondents felt that information was easy to find on their website of choice, with 82.4% choosing "somewhat" easy, and 11.8% choosing "very" easy.

5. How difficult or easy is it to find things on the website? Create Chart Download

	Response Percent	Response Count
Very easy	11.8%	2
Somewhat easy	82.4%	14
Somewhat difficult	5.9%	1
Very difficult	0.0%	0
answered question		17
skipped question		0

When asked how often a cell phone was used to access each user's chosen library site, most (70.6%) indicated "never." Two respondents reported frequent use (weekly), and three reported mobile library access less than once per month.



4. Approximately how often do you use a cell phone to access your library's website?

Create Chart Download

	Response Percent	Response Count
Daily	0.0%	0
Weekly	11.8%	2
Monthly	0.0%	0
Less than Monthly	17.6%	3
Never	70.6%	12
answered question		17
skipped question		0

The final question, an optional free-text prompt for desired website improvements, was answered by 11 people, and netted ten relevant suggestions (Some responses included multiple suggestions and some responses were for out-of-scope items such as the library's holdings.) Based on similarities, these ten suggestions were grouped into sets:

- Search Enhancement (3)
- Mobile Presence (2)
- Personalization (2)
- Course Reserves Enhancements (1)
- Database Access Enhancement (1)
- Online Reference (1).

The complete set of question 6 responses are provided in the Appendix on Page 59.

3.4 Research Conclusions

Contrary to the Pew Foundation findings about increases in mobile web usage (see Section 3.1.1 on page 4), twelve of our survey participants responded that they had never used or had no access to a library's mobile website. This, along with low library-specific mobile web usage reported by Thomas (see Section 3.1.2 on page 5), could be interpreted to indicate low interest.

However, in survey question 6, two people suggested a mobile site as a desired improvement. There is at least some interest in mobile access to academic libraries. Questions to consider are which features should be top priority, and how should those features be implemented.

The recommendations from the Greenblatt study (see Section 3.1.3 on page 5) coincide with some of the needs stressed by our survey respondents in terms of access and navigation, where the

most common feature used by users was catalog searching for books and articles, followed by information about the library.

While informative, the survey may have been more valuable if it had included extra questions about specific preferred features. Also, the findings reported by Alan Aldrich (2010) illustrate that not all students have the same needs and preferences. Thus it would be preferable to speak directly with NJIT students about their exact needs for a mobile website. Since circumstances and time constraints have prevented extending a survey to, and conducting interviews with, students at NJIT, we have done our best to cover this research gap with judgment and other research approaches such the evaluation of the Van Houten full-size site.

Success of the finished website can be measured by the level of student acceptance. Using the Library Journal survey results as a baseline (Thomas, 2010), if at least 6% of the library's information access online is retrieved through the new mobile website (given a reasonable amount of time for the site to be promoted and awareness of the site to spread), then this project should be considered successful.

4.0 Requirements

Based on information revealed in our research, we have selected several target features for the Van Houten mobile offering. These features are prioritized with consideration for anticipated demand as well as suitability for mobile computing. While recent technologies such as Mobile Chrome promise greater flexibility and improved usability in the mobile environment (Schmidt, 2012), the majority of smartphone users still contend with usability tradeoffs that typically accompany small-screen computing (Miles, 2012; Nardi, 2012). Since our primary objective is to fill the needs of the students, we desire a design that is most intuitive and comfortable to use by the majority of users.

Our large number of target features is slightly at odds with advice to minimize content on mobile websites (Web Credible, 2007). But we have considered each feature from a mobile context, and believe that each can be implemented appropriately for small screens. And many of these features work together: eliminating parts of corresponding sets would be difficult.

4.1 Catalog & Site Search

The majority in both FAQs (see Section 3.2.2 on page 7) centered on both catalog and database resources. And responses to survey question 3 rank both catalog and database searching highly (see the Appendix on page 57). Three responses to question 6 pertain to improving search capabilities, including a request to "Search for books like we search on google!"

This survey request introduces an additional consideration: the growing trend for students to rely on Google and other Internet search engines while conducting research. This trend is a concern for librarians because of the high variation in quality of freely-available Internet information - and because students who are unaware of the library's full range of resources may undervalue the library's services (Google vs., 2011, Hughes, 2008). Addressing such a complex issue will likely require education and promotion over time. But a possible way to contribute to this awareness campaign is to mimic the simplistic appearance and functionality of the Google website as much as possible.

Therefore, this search feature should be simple in appearance, with high-powered indexing, retrieval algorithms (appropriately balanced for recall & precision), query builders, and refinement options (Morville and Rosenfield, 2008, chap. 8).

Based on observations in the formal website evaluations (see Page 6), this search tool should also include the option to search either the catalog, or the site itself.

4.2 Database Access

The rationale for database, or "eResource," access is similar to those for Catalog & Site Search: both the FAQs and survey indicate that this is a highly desired feature. In addition, one response to Survey question 6 pertains to improving DB access.

This feature should allow users to browse or search for databases by name or subject area. Once a database is selected, users should be prompted to log in (if not already authenticated), and then directed to the appropriate database portal.

Based on examples set by UCF Libraries and the UW's University Libraries, it seems best to offer only mobile-friendly databases at this time.

4.3 Policies

In survey question 3, "Look up hours, policies, or contact information" ranked next after "Search.. catalog," and "Search... databases" (which were tied). And policy-oriented questions were the second-most common items seen in both FAQs. Finally, the low-interaction nature of this type of reference information is especially appropriate for small screens.

This feature should allow users to search for and browse policies by title and topic area.

4.4 Staff Information

Also influenced by survey question 3, this feature should allow users to search for and browse staff contact information by name and topic area.

4.5 Help Information

Requests for instruction on reference and resource access were also prevalent in the sample FAQs. And the nature of this feature is also low-interaction. The possibility of video content is particularly suited to mobile phone viewing.

Users should be able search for and browse online help information (both textual and video). Any video content must employ a protocol that viewable across platforms (in other words, reliance on Flash should be avoided since Macintosh products block this technology).

4.6 Research Guides

Research guides relate closely to help and tutorials, since their intent is to help users succeed in their research by looking in the most appropriate place. All of our sample websites, both full-sized and mobile, provide this type of feature.

Similar to the help feature, Research Guides should allow users to search for and browse available research guides.

4.7 Account Status & Personalized Information

Examples of this type of feature could not be explored in most sample library sites due to login restrictions, and it was not thoroughly explored in our survey. However, two responses to survey question 6 point to this (see 7.3 on page 59). And overall Web 2.0 trends are moving toward content that is more "user-centric" and personally relevant to each user (O'Reilly, 2005, Valdes & Smith, 2005). As recently noted by Wei Ding,

> "...personalization is one of the approaches that can tie all the usage together to make the academic library a central portal for learning, information access and knowledge management." (2012)

Ideally, this feature should offer some personalization without requiring users to log in. The rationale for this is avoiding the input-intensive chore of logging in when possible, since the text entry needed for this activity is sometimes awkward on small devices (Ding & Lin).

If the user's identity can be determined from the user's device information or IP, non-sensitive information like recently-viewed items and saved searches should be presented automatically. To guard against confusion from accidental mis-identification, a welcome message should identify the detected user, with the option to manually clarify the user's identity.

For sensitive information pertaining to the user's library account, the user must be prompted to formally log in due to security concerns. The login page should provide reminders about the nature of the user's login name (e.g. student or computing ID). The password field should briefly echo each entered character in clear text before "greeking" it. And if a login attempt fails, the screen should describe how to recover or reset forgotten passwords and where to apply for new accounts.

Candidates for account-related display information include:

- Account status
- Checked out items and respective due dates
- Fees due (if any)
- Pending inter-library loan requests
- Pending reference assistance submissions.

4.8 Operating Hours

Operating hours ranked fairly high in survey question 3, although it was combined with "policies, or contact information."

This feature should permit users to look up the library's operating hours

4.9 Maps

Map-related questions were not common in the reviewed library FAQs and we (unfortunately) failed to present this as an option in the survey. However, location-oriented features are very phone-appropriate, and logic suggests that at least some users will want to know how to get to the library.

This feature should permit users to obtain directions to the library. Users should also have access to an internal floor plan that would help them locate sections within the library. A live "you are here" marker on the floor plan would add significant value, if feasible.

4.10 Reference Chat

The design team anticipated reference chat to be the top-ranked feature among users, based on examples found in formal website evaluations and supplemental visits. But this expectation was contradicted by responses to survey question 3, which rank "Submit reference questions" as the least popular activity.

Our team debated how strongly the survey results should influence the priority of this item, considering a possible skew incurred by the high concentration of LIS students in the survey's recipients. (Since LIS students may be more inclined to do their own research than students in other majors.)

But we also considered the idea that this feature's prevalence on our sample library's website does not necessarily indicate that the feature is commonly-used; it may only indicate that the libraries think this feature *ought* to be commonly-used.

In any case, this feature should allow users to connect to reference assistance by phone, chat, or email. Any hyperlinks provided during a chat must open in a separate window or be stored in a bookmark file so that the ongoing chat is not interrupted. The hours and availability of each type of reference should be visible up front, before the user attempts to engage.

4.11 Resource Reservations

This feature is inspired by an example on the UCF Libraries mobile site, and appeals to the design team as a logically useful feature. However, we have reserved it for last since such a feature has not been mentioned in our other research of user input.

Users should be able to view the availability of reservation-based resources such as study rooms and computers in an intuitive, visual manner. Users should also be able to submit a reservation for any available resource. Some type of reminder / notification service would provide added value.

5.0 Design & Evaluation

The design techniques used in this phase found a solid foundation in mobile usability heuristics and best practices, such as those as described by Ding and Lin (2010), Morville and Rosenfeld (2008), Nielsen (2001), and other experts.

As our team progressed through design phases, we repeatedly evaluated our results against our research conclusions. But our design choices were not only informed by the literature, samples, and survey responses: in-person feedback from discount usability tests (Nielsen, 1994), or "sanity checks," helped us iteratively refine and improve our designs.

5.1 Venue

Our first consideration was whether to create a mobile website, or a native mobile application. Each approach has positives and negatives, but a native application is especially beneficial if:

- Planned features are especially complex
- There is value in using the features while not connected to the Internet
- Features need to integrate with parts of the hardware (e.g. camera)
- Collection of a distribution fee is desired.

We weighed these benefits against negatives such as increased development costs (a version of the app must be created for each target platform type), and narrower accessibility (users of unsupported platforms would not have access at all).

Ultimately, we selected a mobile website as our preferred choice according to this reasoning:

- While sophisticated search and mapping interfaces could potentially be complex, static reference features such as reviewing policies and viewing online help are straightforward.
- Since all of the interactive features – catalog and database search, mapping, and reference chat, require an active Internet connection in order to be useful.
- Admittedly, mapping functions could be enhanced with access to device GPS and internal location providers, but the remaining features do not require interfaces with device firmware or hardware.
- Since the mobile site / app would be an extension of library services already offered to students as part of their enrollment, there is no need to charge users for use.

5.2 Information Architecture

5.2.1 Organization & Labeling

Our first step in designing the site's information architecture was to group the features into a smaller number that can be processed more easily. The resulting sets became the major sections of the site, and revealed a hybrid topic / task organization. The presentation order of the sections was influenced by the user priorities gleaned from our research.

We then devised labels for each major section, striving for text that is both short and descriptive. Next, we examined individual sections to identify appropriate secondary organization schemes and labels. The primary and secondary sections are:

- **eResources**
  - **Catalog**
  - **Journals**
  - **Databases**
- **Library Info**
  - **Policies**
  - **Staff Info**
- **Help Guides**
  - **Instructions & Tutorials**
  - **Research Guides**
- **My Research**
  - **Recent**
  - **Account Status**
- **Visit Us**
  - **Hours**
  - **Maps**
- **Ask a Librarian**
  - **Helpdesk**
  - **Chat Reference**
- **Space & Equipment Reservations**
  - **Study Rooms**
  - **Carrels**
  - **Portable Devices**

5.2.2 Navigation & Search

For global navigation, our team considered creating a set of persistent menu options that would appear on every page throughout the site. But the limited real estate on phone-size screens prompted us to reconsider this approach: in order to represent all the sections of the site on a single line, the options on this menu would need to be quite small. This would require cryptic abbreviation of some labels and would result in very closely-spaced, difficult to target controls according to Fitt's law (described in Ding and Lin, 2010, chap 6.2.1). In addition, this type of global navigation would not easily accommodate any future additions to the site's sections. We observed this exact issue on the mobile website for Drexel University Libraries (see Page 8).

Therefore we implemented an approach inspired by our other mobile website sample, UCF Libraries (see Page 9). In this approach, we provide access to the website's major sections only on the home page. But we provide instant access to home from each inner page. This imposes an extra "click" on any user wishing to move from one section to another. However, because the link to home convention is so well established among web users - an idea reinforced by informal user tests - we believe the mental overhead of this extra click is less than the concentration for the fine-tuned motor control that a crowded menubar would require. Ding and Lin (2010) note that users tolerate "painless" clicks provided that they facilitate efficient information retrieval (p. 96).

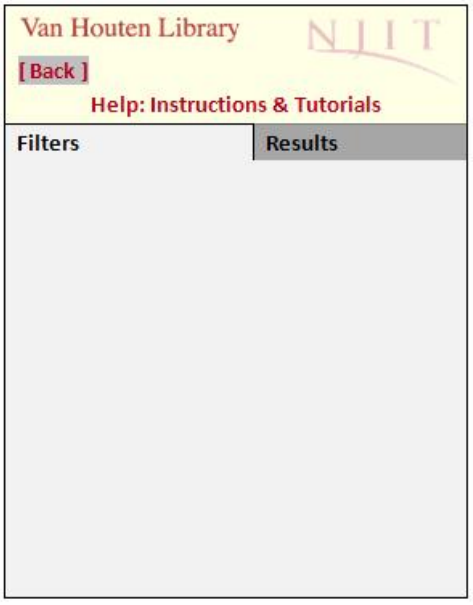
Home Page

On the home page, users will see large buttons that correspond to each major section of the site. The bottom of the home page provides an option for switching to the full-size website site.

The home page will also offer a tool for searching the website, the catalog, or databases. For details, refer to Page 28.

Inner Pages

The top left of each inner page displays a shortened version of library's name ("Van Houten Library"). This name is hyperlinked to the home page, formatted with padding to create a comfortable target area.



Below the library name is a "Back" button, again padded to provide an easy-to-tap target. This button functions as a typical browser back button, which takes the user to the previously-viewed page.

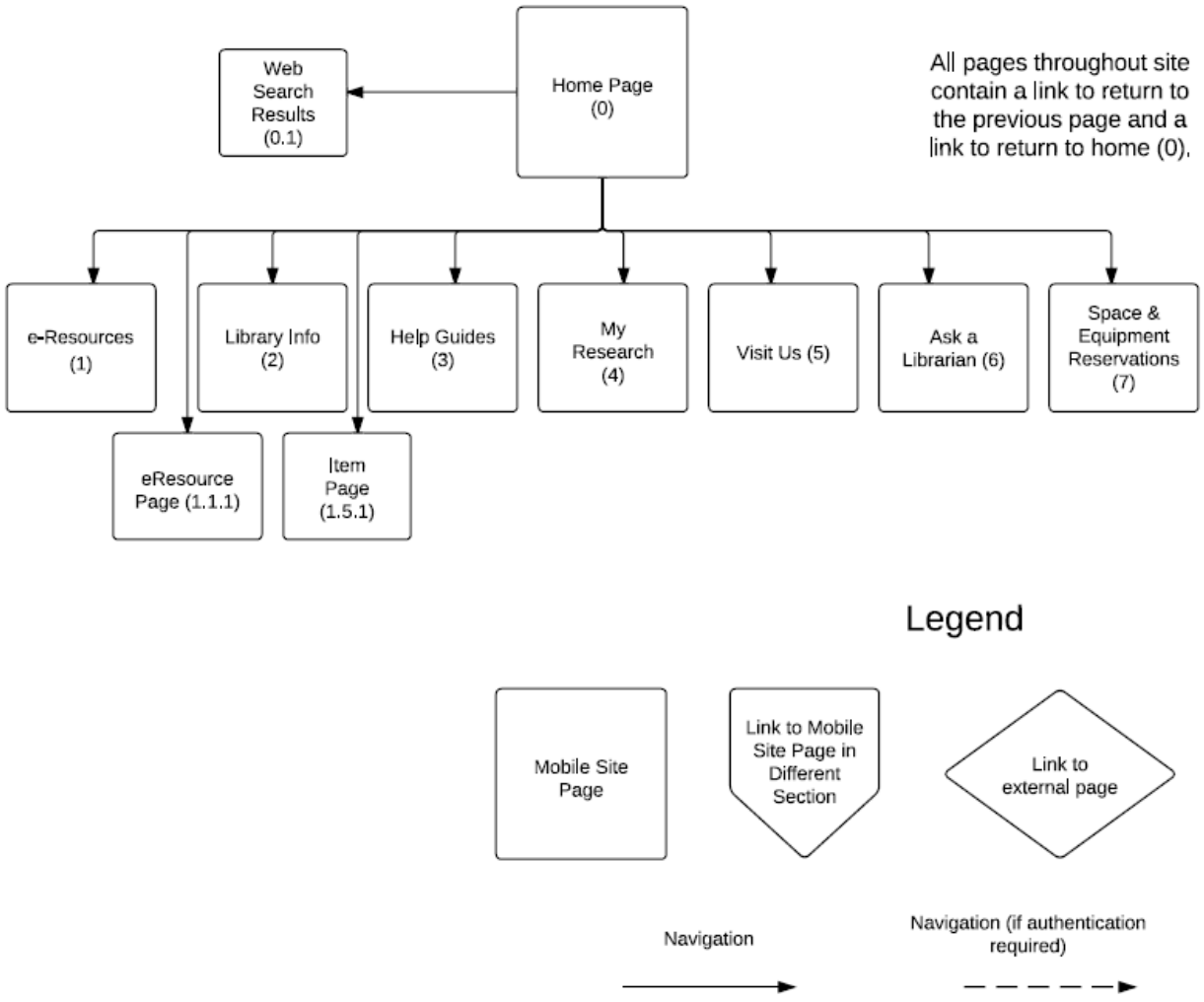
Note that the NJIT logo opposite the home and back controls is a graphical element added for visual balance. The contrast of this image is deliberately faded to create a watermark effect and prevent users from mistaking this graphic as a clickable control.

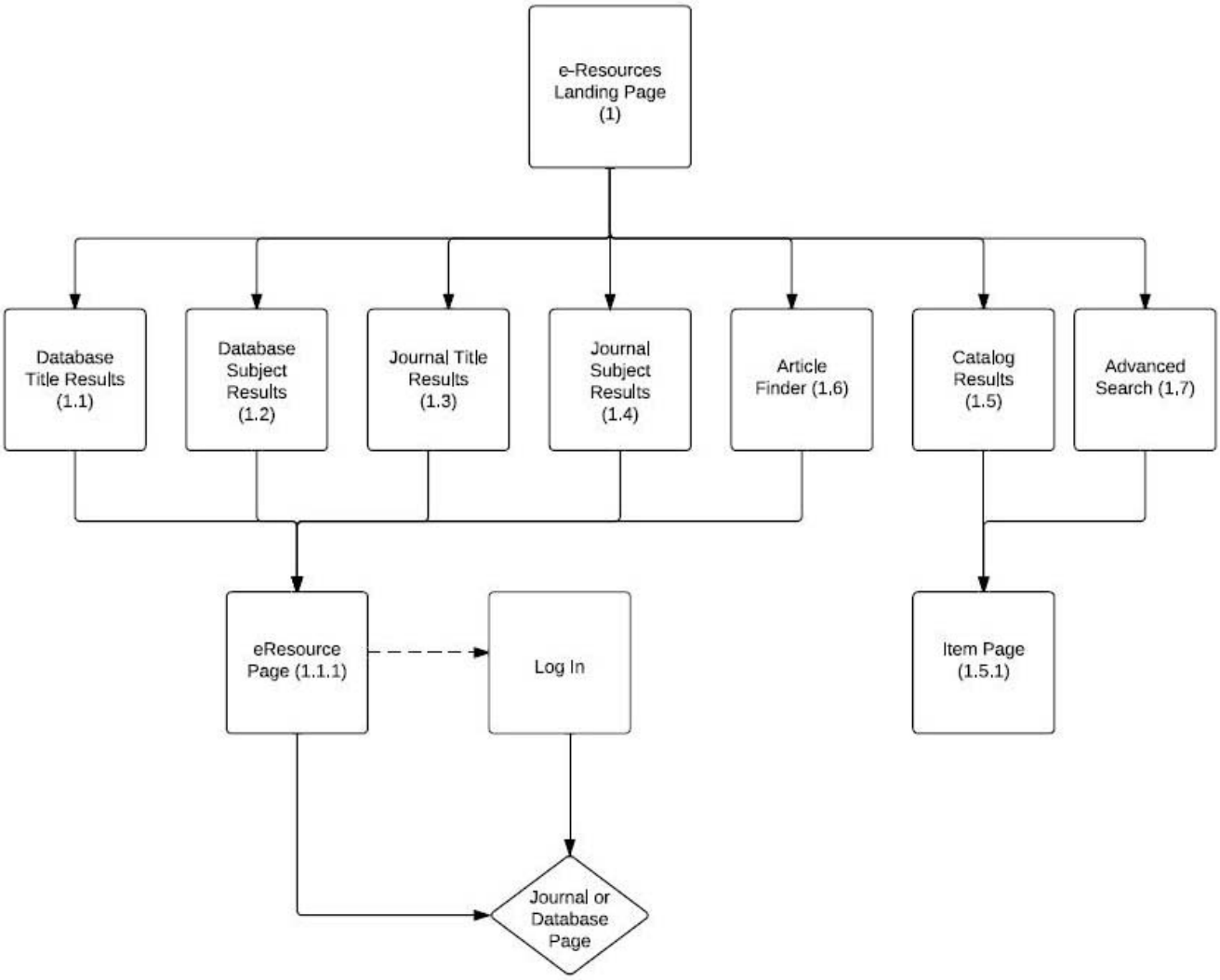
The page title, centered, occupies a third line.

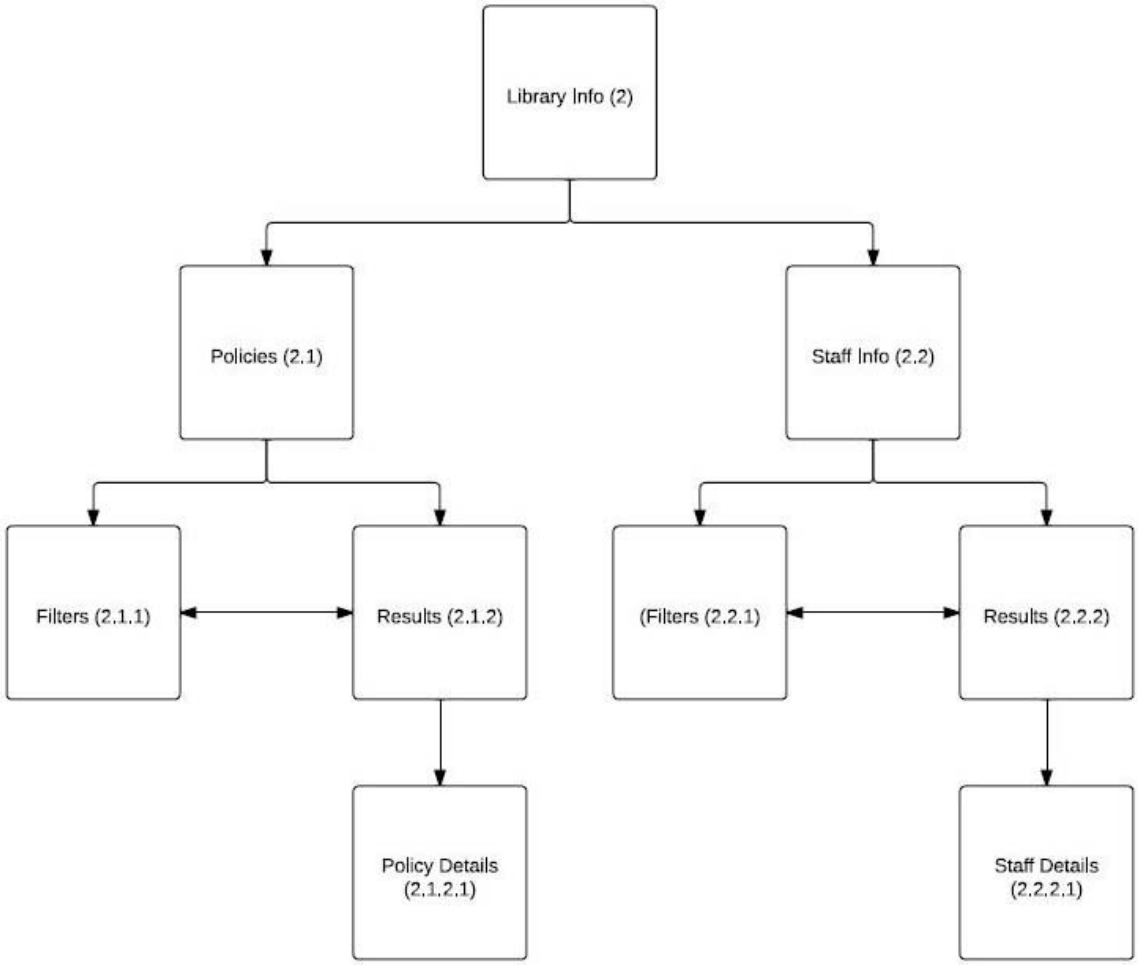
Local Navigation

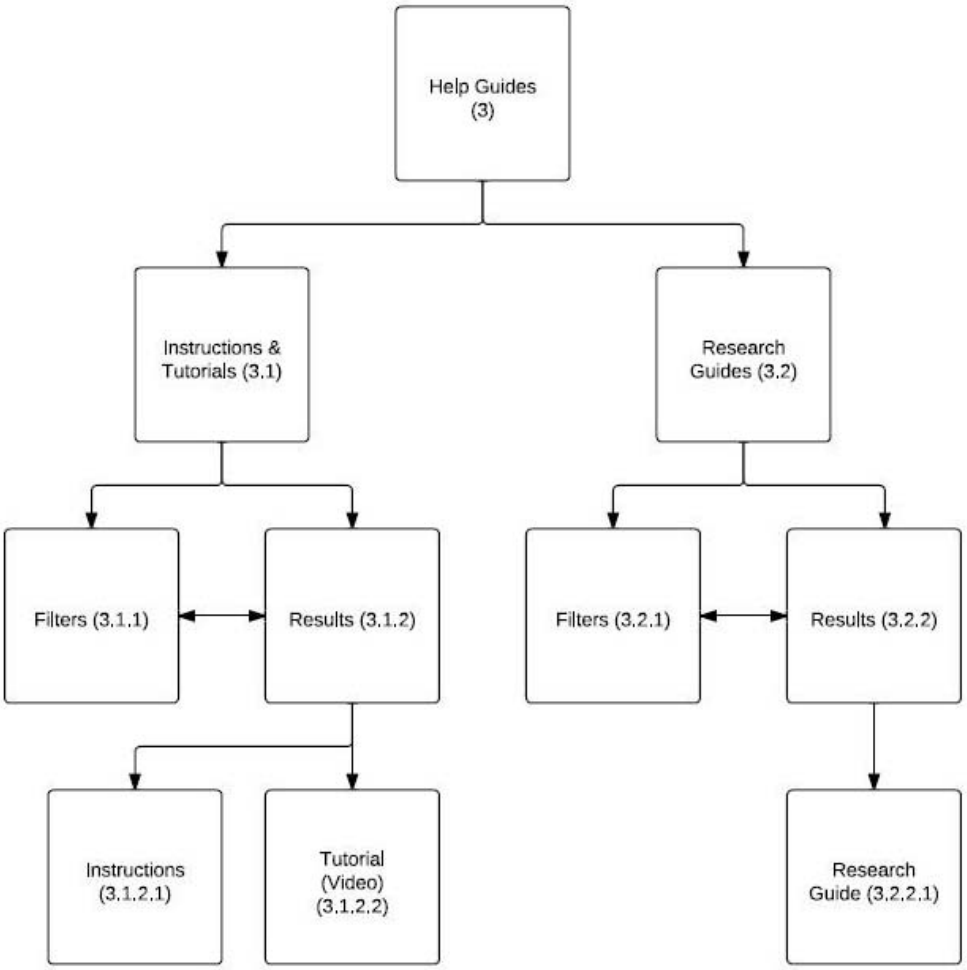
Several pages offer filters for narrowing listed topics within a particular section. These pages appear with two tabs, labeled Filters and Results. These tabs allow users to quickly switch between filter criteria and the list of topics while allowing a comfortable viewing space for both.

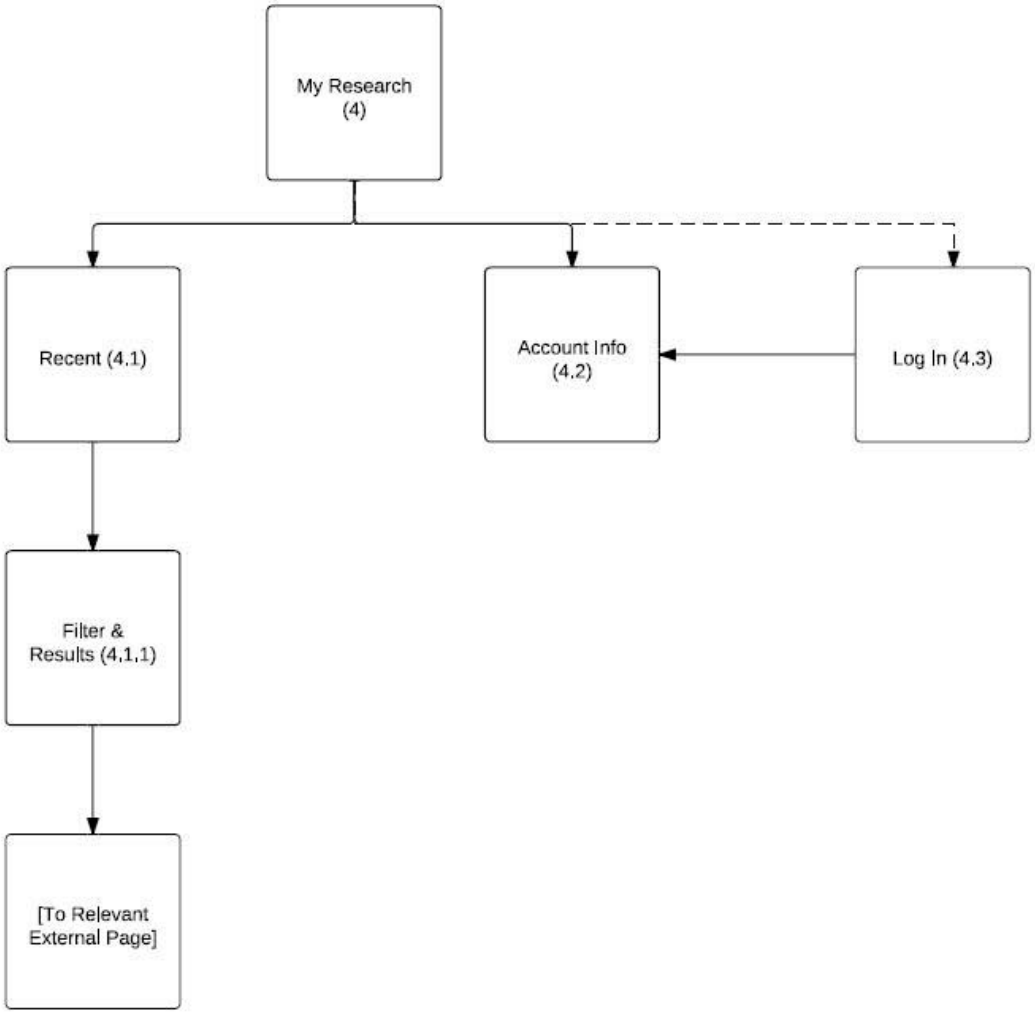
5.2.3 Page Flow Diagrams

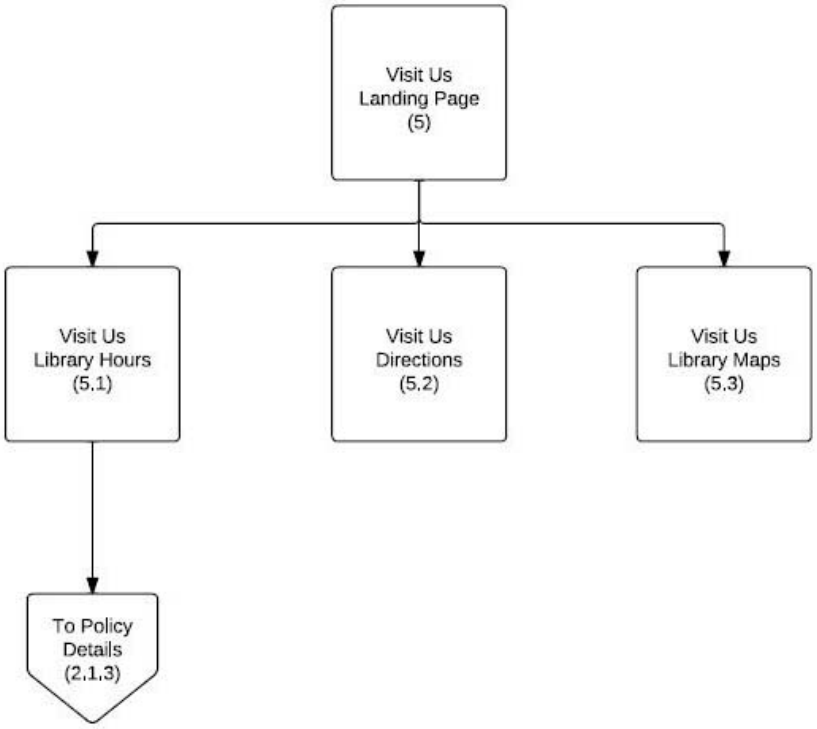


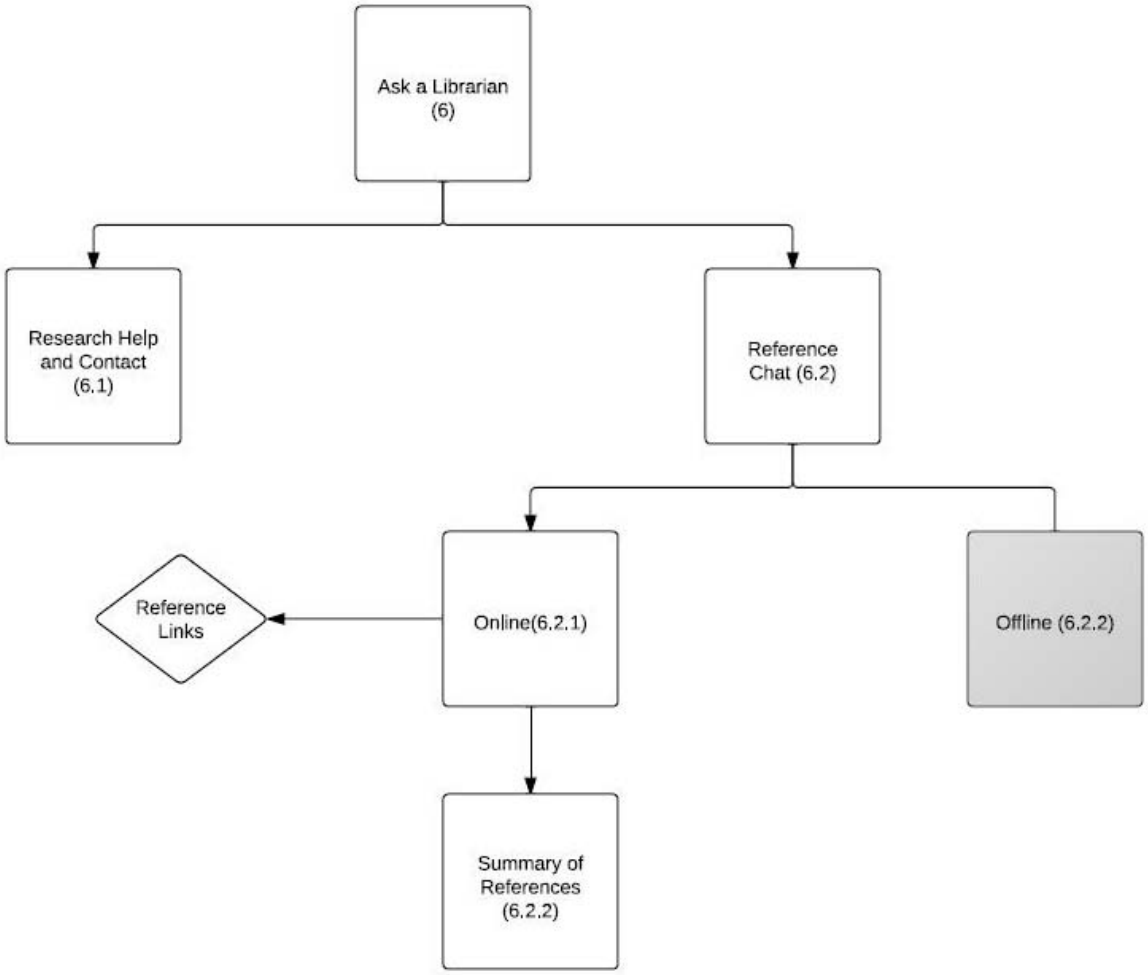

e-Resources Landing Page (1)
Database Title Results (1.1)
Database Subject Results (1.2)
Journal Title Results (1.3)
Journal Subject Results (1.4)
Article Finder (1,6)
Catalog Results (1.5)
Advanced Search (1,7)
eResource Page (1.1.1)
Log In
Item Page (1.5.1)
Journal or Database Page

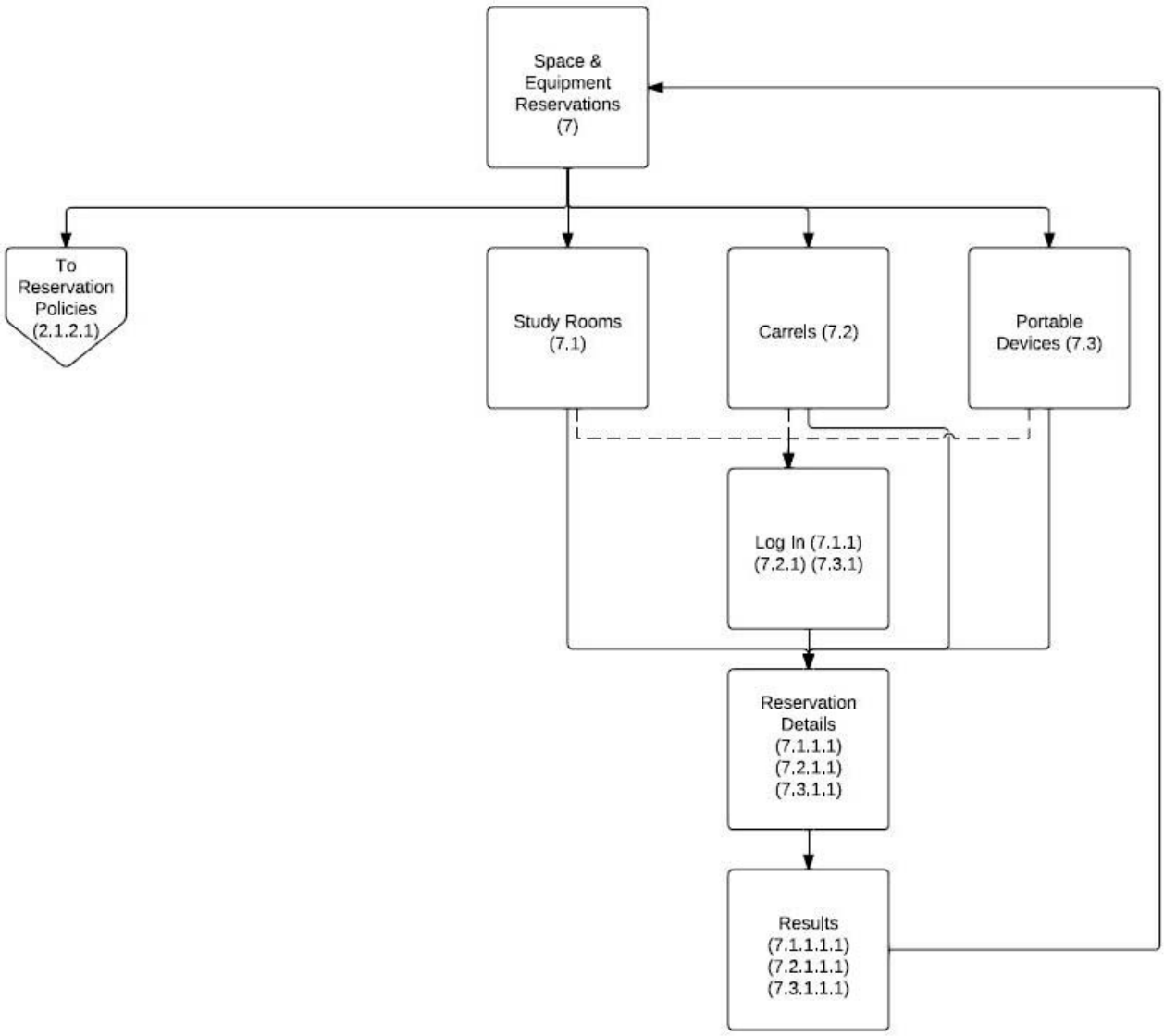

Library Info (2)
Policies (2.1)
Staff Info (2.2)
Filters (2.1.1)
Results (2.1.2)
(Filters (2.2.1)
Results (2.2.2)
Policy Details (2.1.2.1)
Staff Details (2.2.2.1)


Help Guides (3)
Instructions & Tutorials (3.1)
Research Guides (3.2)
Filters (3.1.1)
Results (3.1.2)
Filters (3.2.1)
Results (3.2.2)
Instructions (3.1.2.1)
Tutorial (Video) (3.1.2.2)
Research Guide (3.2.2.1)


My Research
(4)
Recent (4.1)
Account Info
(4.2)
Log In (4.3)
Filter &
Results (4.1.1)
[To Relevant
External Page]


Visit Us
Landing Page
(5)
Visit Us
Library Hours
(5.1)
Visit Us
Directions
(5.2)
Visit Us
Library Maps
(5.3)
To Policy
Details
(2.1.3)


Ask a Librarian (6)
Research Help and Contact (6.1)
Reference Chat (6.2)
Reference Links
Online(6.2.1)
Offline (6.2.2)
Summary of References (6.2.2)


Space & Equipment Reservations (7)
To Reservation Policies (2.1.2.1)
Study Rooms (7.1)
Carrels (7.2)
Portable Devices (7.3)
Log In (7.1.1) (7.2.1) (7.3.1)
Reservation Details (7.1.1.1) (7.2.1.1) (7.3.1.1)
Results (7.1.1.1.1) (7.2.1.1.1) (7.3.1.1.1)

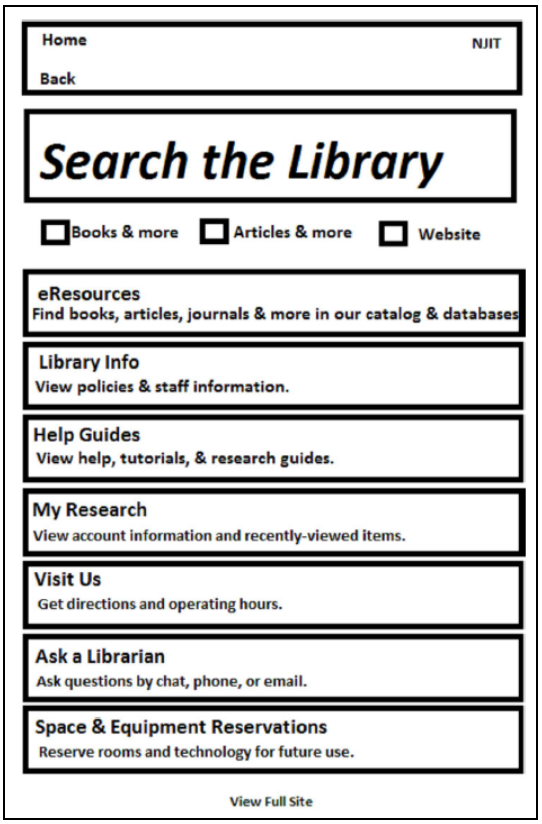
5.3 Feature Details

5.3.1 Home Page

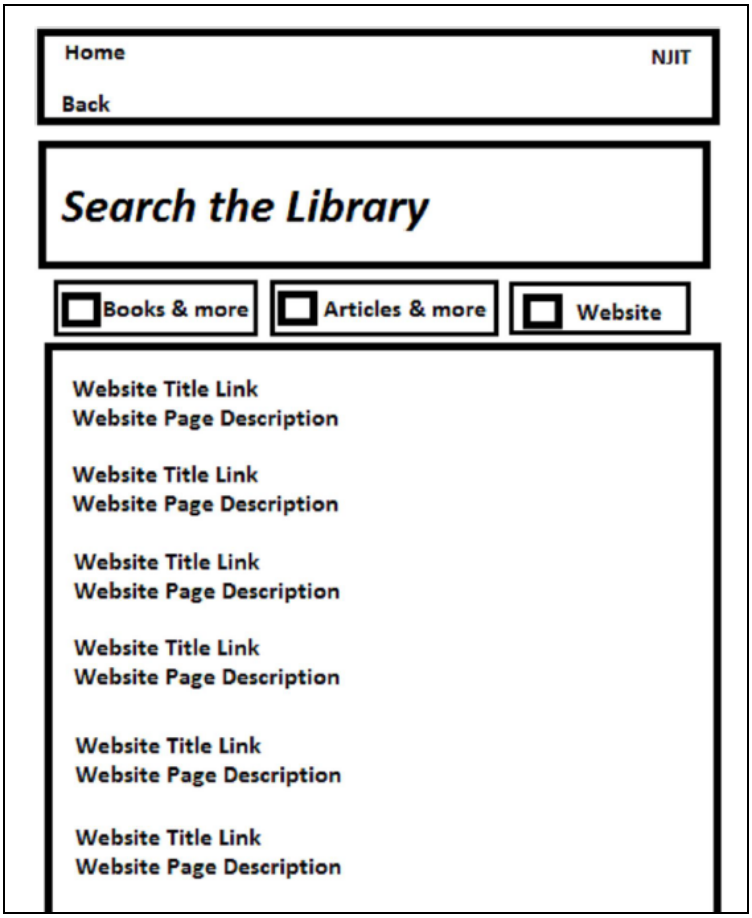
In the interest of placing a popular function immediately at users' fingertips, the top of the home page (below banner & title) displays a multi-functional search tool which allows users to search the catalog, databases, OR the site itself. This tool consists of a simple text entry box followed by three "check buttons" (see Section 5.3.3 on page 34 for more information about these.)

The search tool is followed by a series of selection buttons for each section of the site (these serve as part of the global navigation). The title of each section is paired with a brief description to clarify what users may expect to find in each.

Wireframe:



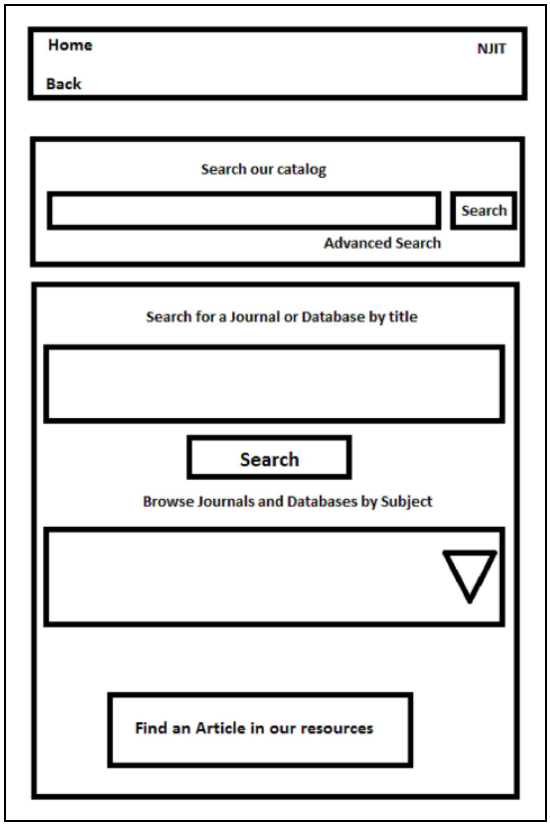
Resulting Mockup:


Home
NJIT
Back
Search the Library
Books & more
Articles & more
Website
Website Title Link
Website Page Description
Website Title Link
Website Page Description
Website Title Link
Website Page Description
Website Title Link
Website Page Description
Website Title Link
Website Page Description
Website Title Link
Website Page Description

5.3.2 eResources

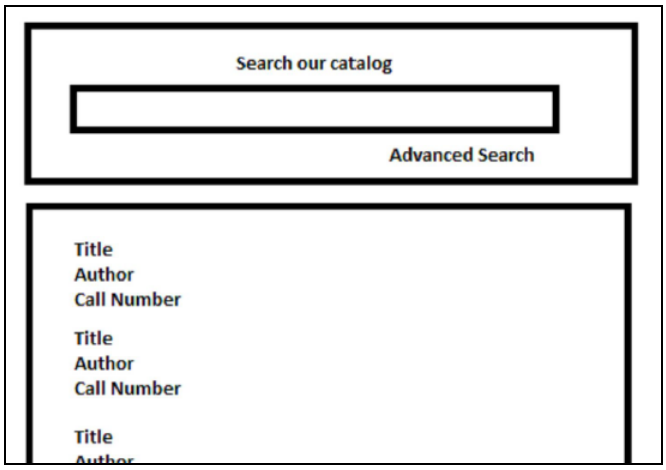
Designing the eResources access pages required a certain amount of similarity in pages, as this section of the mobile site functions as the means of searching not only the library's catalog of print and other physical media, but all of the database and journals within library as well. Due to the fact that users can search only a single database or journal at a time within this feature, it was necessary to design a means for users to find the database or journal that they are searching for.

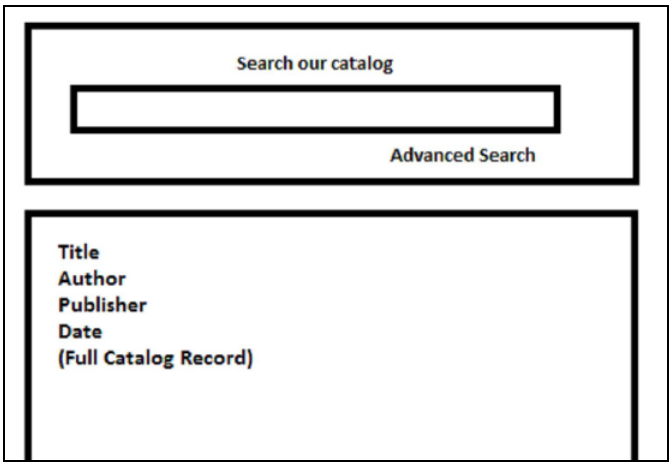
Wireframe:

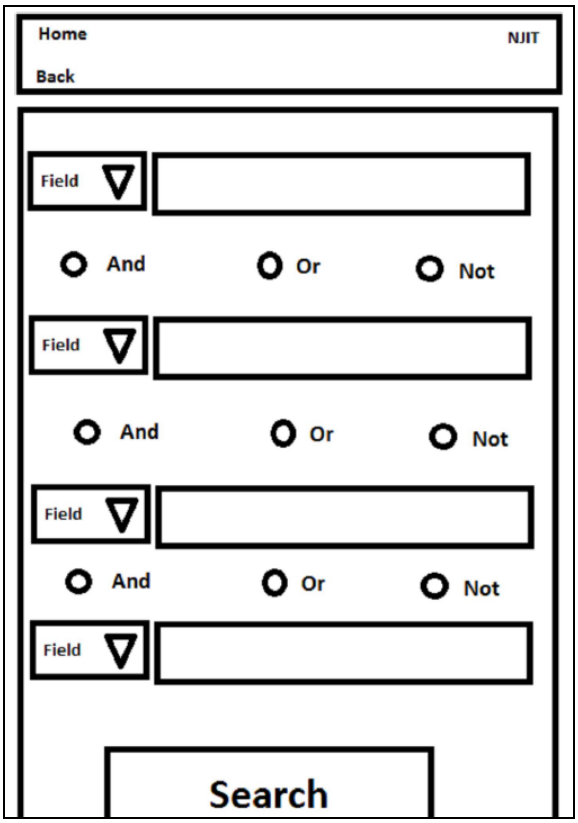


Resulting Mockup:

The catalog search is straightforward, allowing a simple keyword search from the landing page, with a link to an advanced search page below the search box. The search structure is repeated on the result pages, allowing the user to search iteratively without returning to the main eResource page. When an item in the results is selected, it is displayed on a single item page:



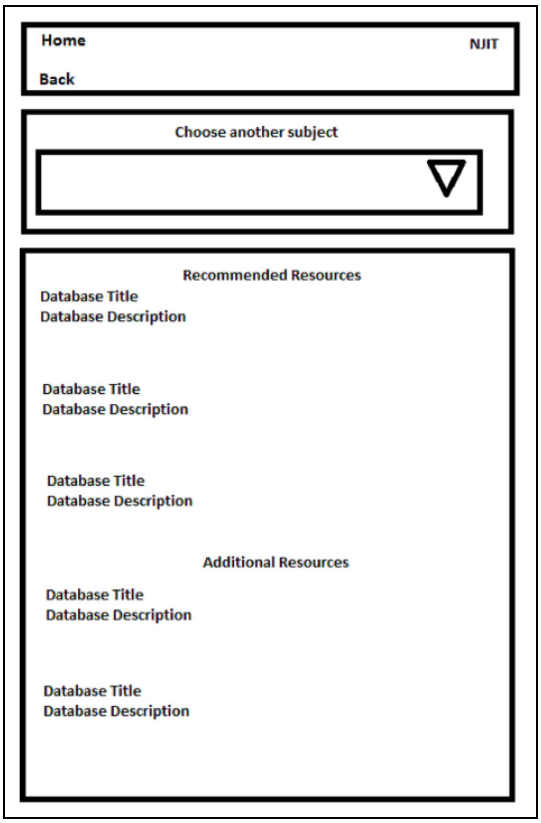




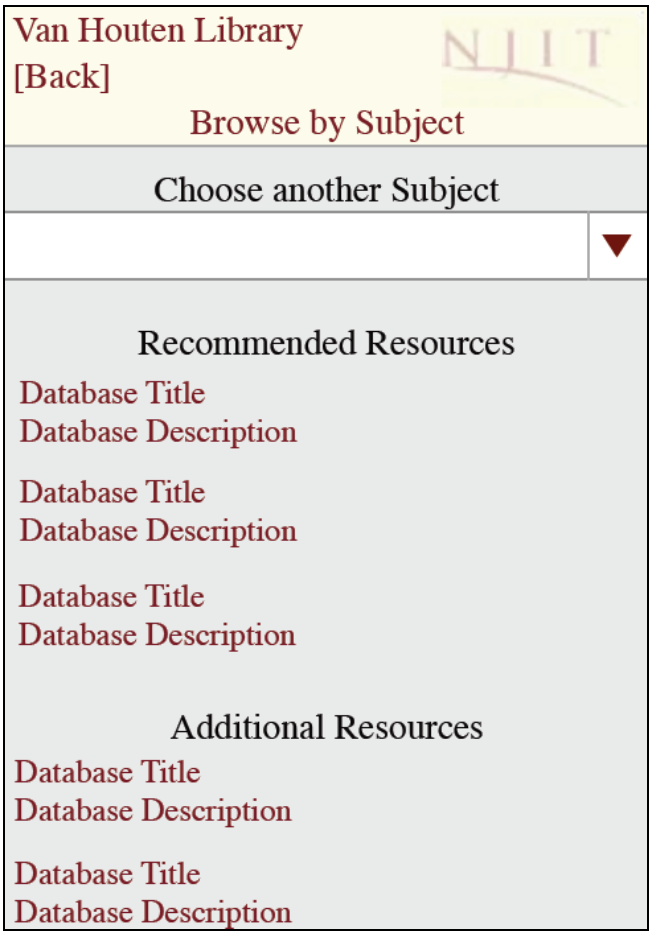
For journals and databases, both title and subject searches are allowed, similar to most academic designs.

- The title search is a simple search that lets the user input part of a journal or database title.
- Subject searches consist of a dropdown menu to select a subject, at which point the new page loads and displays the recommended list of resources for that subject, in decreasing order of recommendation.

Wireframe:



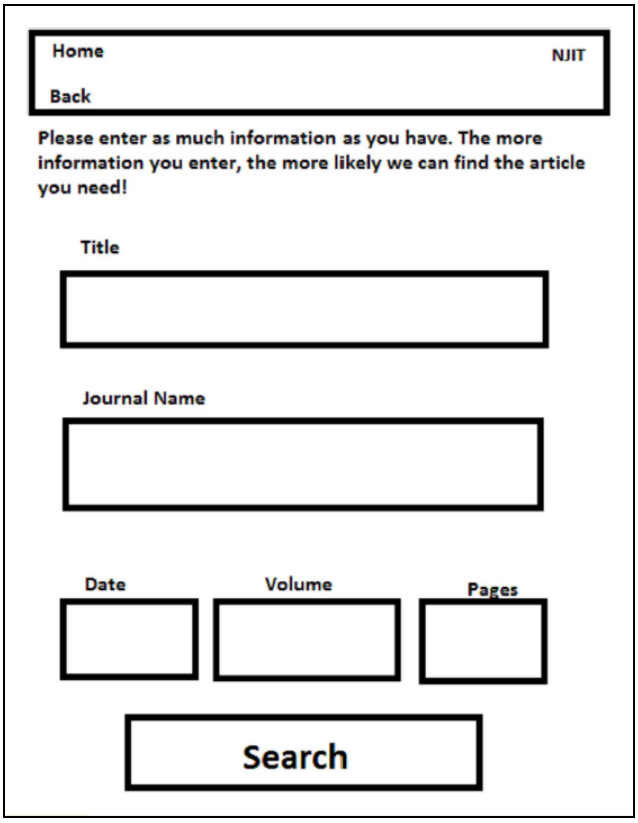
Resulting Mockup:



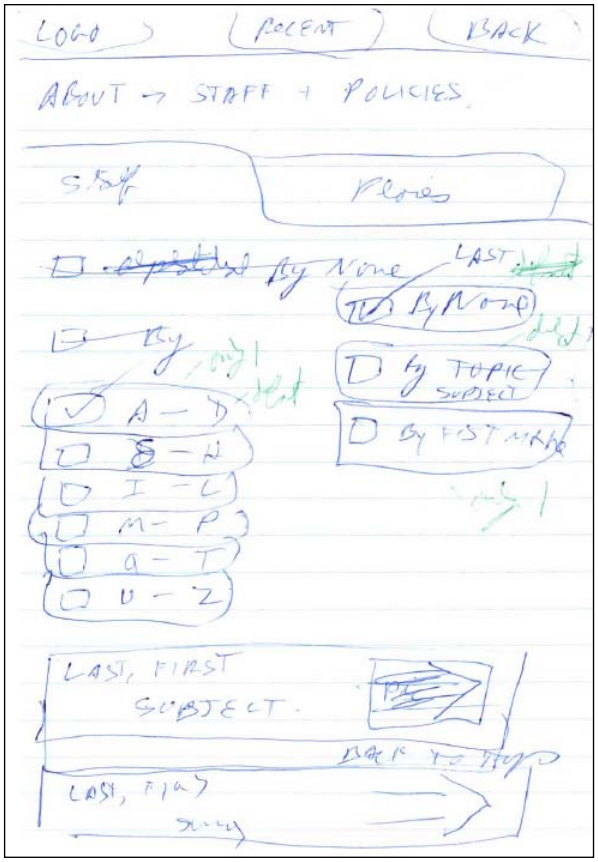
On searching, the journal or database is displayed within the alphabetical journal listing, allowing the user to browse forward and backward.

As with catalog results, when a journal or database item in the results is selected, it is displayed on a single item page. If users choose to enter the database, they leave the library's mobile site and enter the proprietary resource. If not already logged in, users are prompted to authorize through the library's proxy server.

The article finder is accessed through a button at the bottom of the main landing page, and allows users with a specific citation to enter than information, which will then go through the library's link resolver, and attempt to connect the user with the resource on an eResource page in the same way that clicking through to the resource through the standard searches would:



5.3.3 Library Info

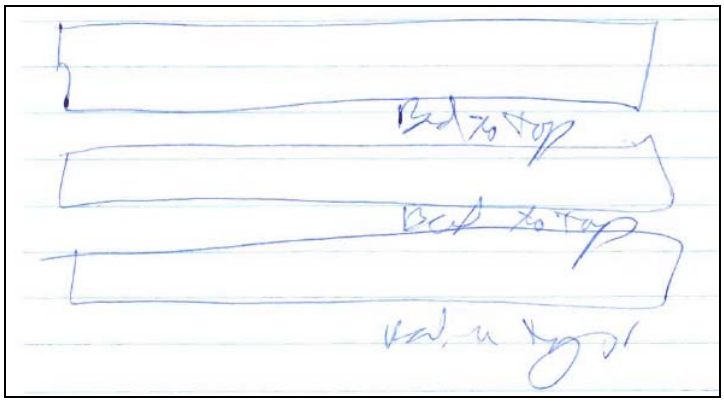


The initial design for this screen placed the subsections, Staff Info and Policies on the same page, arranged as two tabs.

Each tab provided filtering controls at the top of the page, above a list of entries which would dynamically change depending on filters selected by the user. With no filters applied, the page would display the entire list of either staff members or policies. Since vertical scrolling is a common, well-supported characteristic on mobile phones, we felt comfortable with the prospect of a lengthy list. Informal "hallway" testing with mobile phone users supports this.

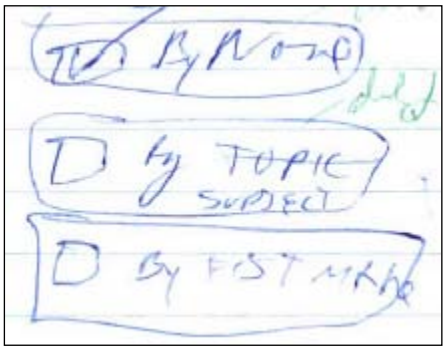
With the filtering controls at the top of the list, however, we wanted to provide means to instantly return to the top of the list so that users could quickly alternate between refining the filters and scanning the list. To support this, we added "Back to Top" buttons in a contrasting color between each data entry:

Concept Sketch:



After informal user input, we amended the design of the back to top function: rather than a recurring control, we devised a single fixed position (non-scrolling in a separate layer) control at the bottom of the screen. This design had the potential to significantly shorten the height of the list of data, and reduced the chances of accidental selection.

The filters on both tabs inspired a new type of control, which we coined "checkbuttons." Initial sketches depicted sets of filter options that would be selected via a traditional checkbox. But review of our mobile website examples (see Page 8) and mobile design guidelines revealed that the small target area of checkboxes is not appropriate for small screens. Therefore we decided that the text and its surrounding area should be "clickable" (i.e. block-level anchor tags). The checkbox itself is actually two interchangeable static images enclosed within the clickable area, which will be swapped with scripting technologies to convey the status of each toggle-like button.



For Staff Info, user have an alphabetical filter combined with one of three sort options:

[ ]	A – D	[ ]	by Last Name
[ ]	E – H	[ ]	by Subject Area
[ ]	I – L	[ ]	by First Name
[ ]	M – P		
[ ]	Q – T		
[ ]	U - Z		

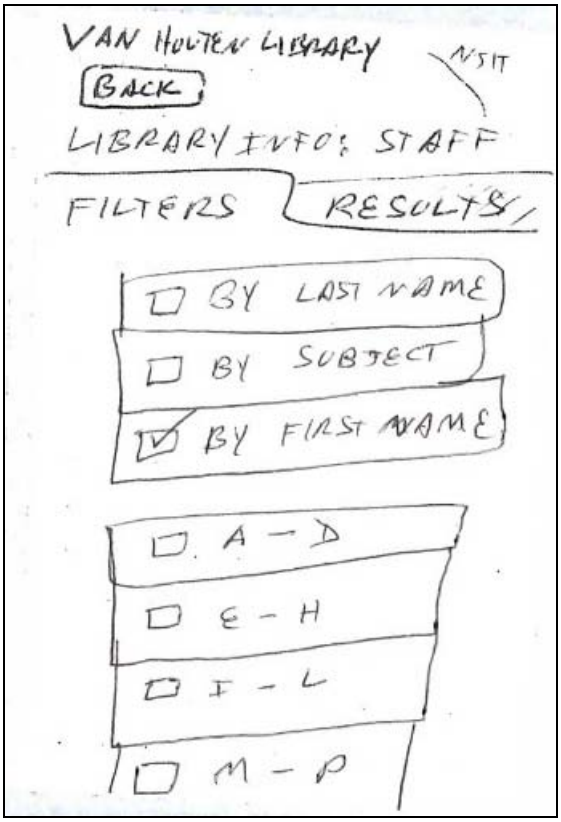
For Policies, users can filter by topic and location. Due to the varying amount of information and depth of detail in policies, some users may desire finer control – thus the addition of a free-text input field for keywords. This field is completely optional, keeping in mind that text entry involves more effort on a small device.

	[optional keywords]		
[ ]	Borrowing		
[ ]	Equipment	[ ]	In the Library
[ ]	Accounts	[ ]	Online
[ ]	topic		
[ ]	topic		

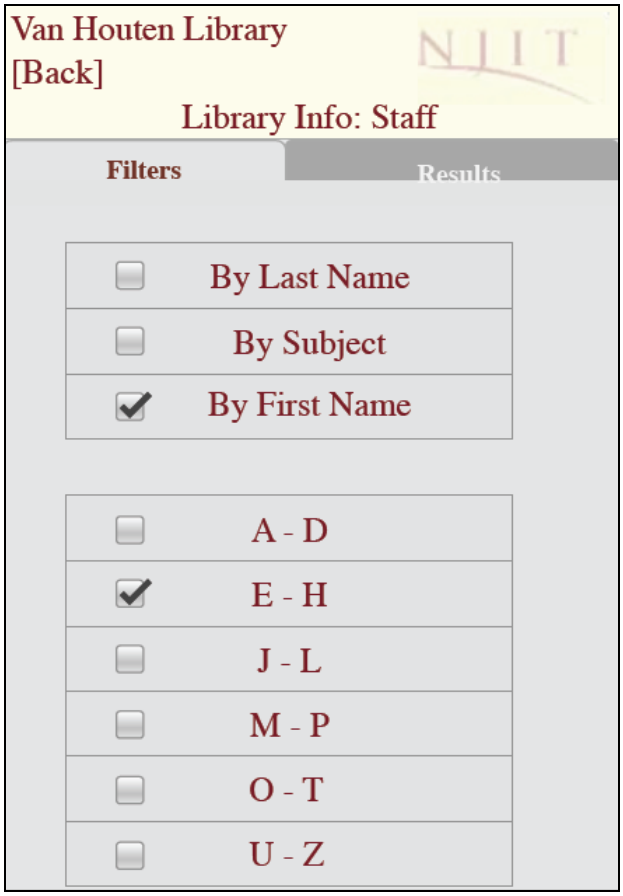
In the original design, we attempted to lay out the filter options side-by side in two columns, thinking to reduce the amount of vertical space occupied by the filter controls. But as we worked, it became clear that this was overambitious for roughly two and half inches of horizontal space: the labels of some of the filters are fairly lengthy. This realization caused us to ask, should the filters be on the same page as the data they control?

The answer to this question came in the form of a significant redesign: Policies and Staff were moved to dedicated pages of their own. Filters were placed on one tab, and Results on the other:

Wireframe:



Resulting Mockup:



More questions were revealed: which tab should contain what content, and which tab should be in focus when the user first lands on the page? We resolved one question immediately: since the site language is in English, and English uses a left-to-right text direction, the left tab should be in focus first.

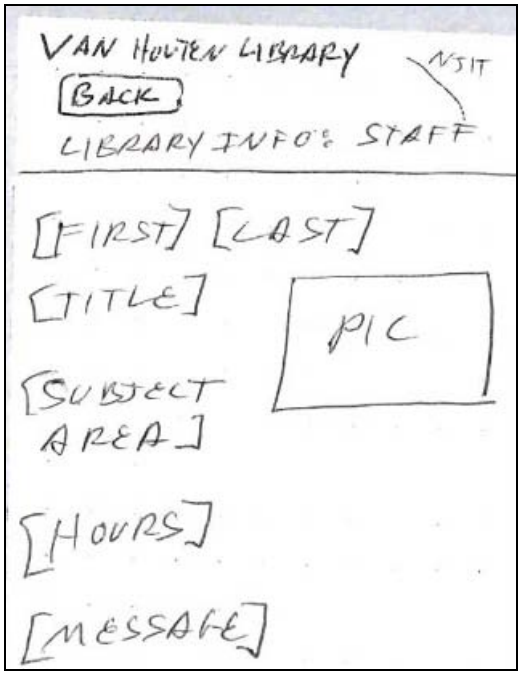
The second question, whether to display results or filters first, hinges on the default result set in the absence of any filters: if all results are displayed with no filters (which logically makes sense), then it would be appropriate for Results to be in focus first. Users would start with the full list of data, then filter it as desired. But this introduces a potential performance challenge: with a very long list and a very slow data connection, time required to display the screen could be impaired. Since mobile computing is tends to be digital and results-oriented (Aldrich, 2010), standard cautions against "fat" page loads are doubly important in this context.

Therefore we reverted to the alternate approach of retrieving no data until a request is triggered by the user. This approach requires the filters tab to display first, since the user would land on a blank screen otherwise. While the user considers the available options, the page should begin background-loading the full dataset in anticipation of the user's desire to view the results tab

(Schmidt, 2012). The act of tapping the Results tab will function as the "submit" of any selected filter criteria.

Once results are displayed, clicking an item in the list opens detailed policy or staff information in a dedicated page:

Wireframe:

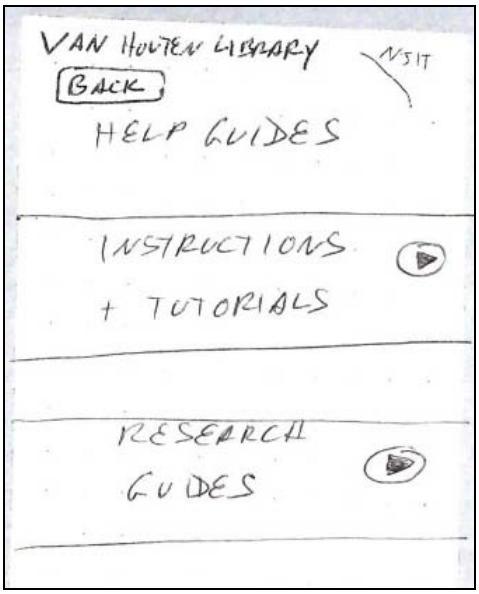


Resulting Mockup:

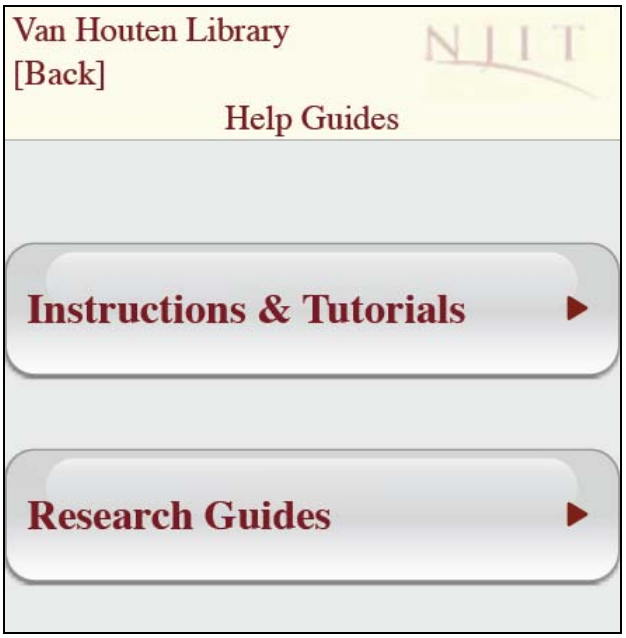
5.3.4 Help Guides

The first page of the section prompts users to choose a subsection:

Wireframe:



Resulting Mockup:



Since Help Guides, like Library Info, contains two subsections which would be filtered and viewed in a similar way, we decided to use the same Filter tab / Results tab display model. This consistency helps tie the overall application together and saves users from having to learn different navigation techniques for different areas.

Filters for Instructions & Tutorials:

[optional keywords]

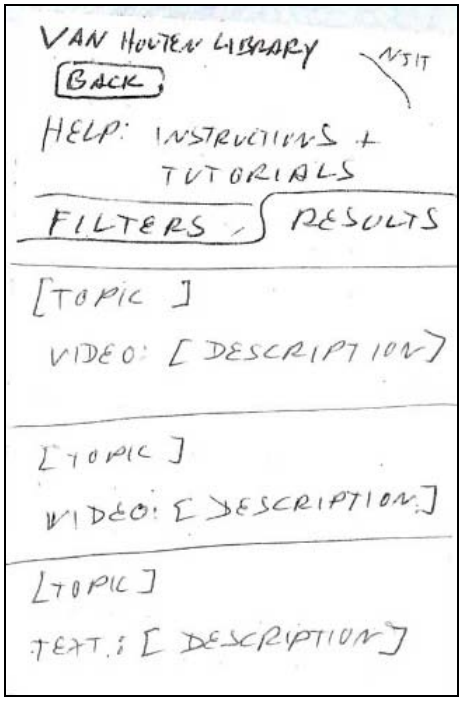
[ ] Catalog: finding books & non-periodicals	[ ] Text
[ ] Databases: finding articles & journals	[ ] Video
[ ] Using onsite resources	[ ] In the Library
[ ] Borrowing	
[ ] Inter-Library Loan	[ ] Online (full size)
[ ] topic	
[ ] topic	[ ] Mobile Online

Filters for Research Guides:

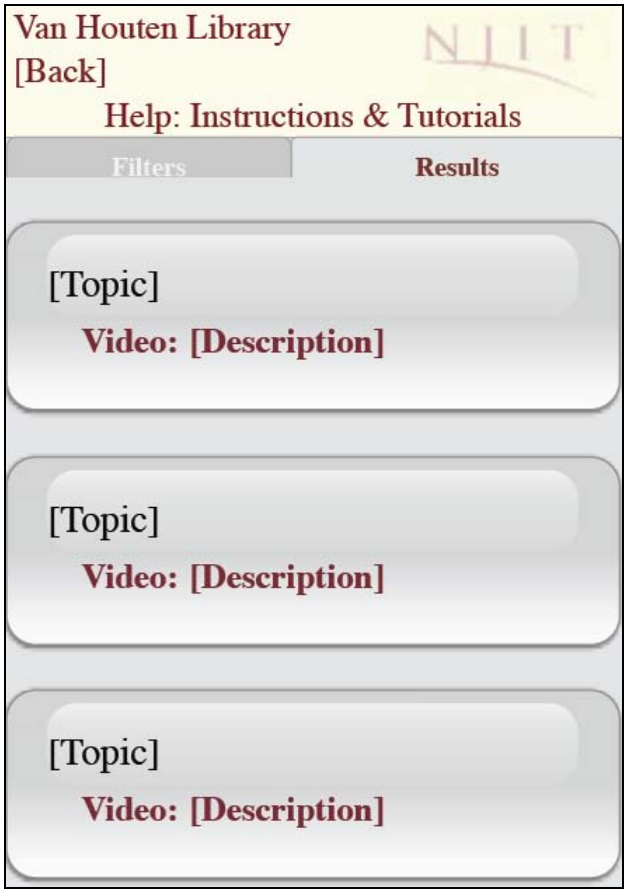
[optional keywords]	
[ ]	Business
[ ]	Careers
[ ]	Education
[ ]	Engineering
[ ]	topic
[ ]	topic

Results items for both subsections will be labeled by topic and short description:

Wireframe:



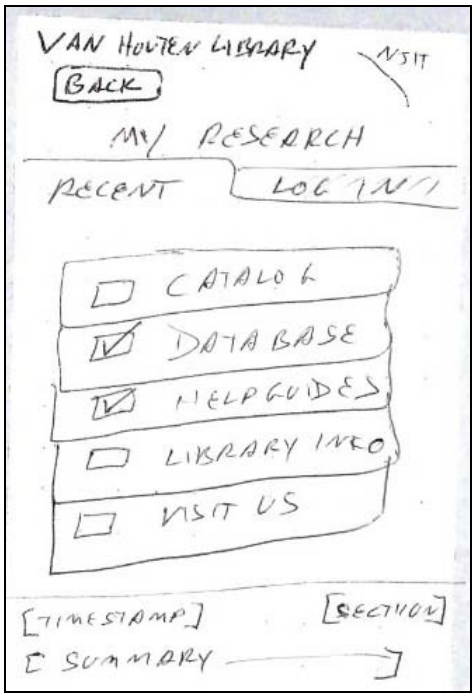
Resulting Mockup:



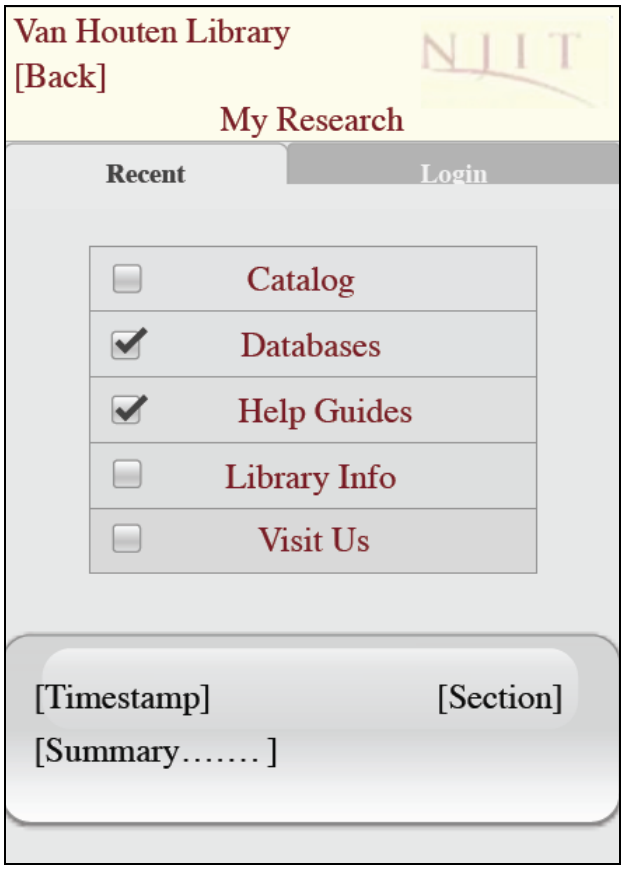
5.3.5 My Research

While the content of this section is different in nature than Help Guides and Library Info, the dual subsections allow us to again make use of the two-tab model. Since there are fewer filtering needs, we opted to place the subsections side by side in this case:

Wireframe:



Resulting Mockup:



The Recent tab offers a single set of filters, roughly corresponding to the site's major sections:

[ ]	eResources: Catalog
[ ]	eResources: Databases
[ ]	eResources: Articles
[ ]	Library Info
[ ]	Help Guides
[ ]	Visit Us

The intent is to provide quick links to the user's viewing history. The list of items will be sorted reverse-chronologically by date of access, labeled by filter category, with a brief abstract. When an item is clicked, the user will jump to that location in the website – however, the My Research page will remember the filter settings within the current session. As a result, users can resume history browsing from where they left.

For this section, special navigation was originally considered: the global navigation initially included a "Recent" button at the top center of the page which would take the user directly to My Research – Recent. But we determined that this would be overly crowded.

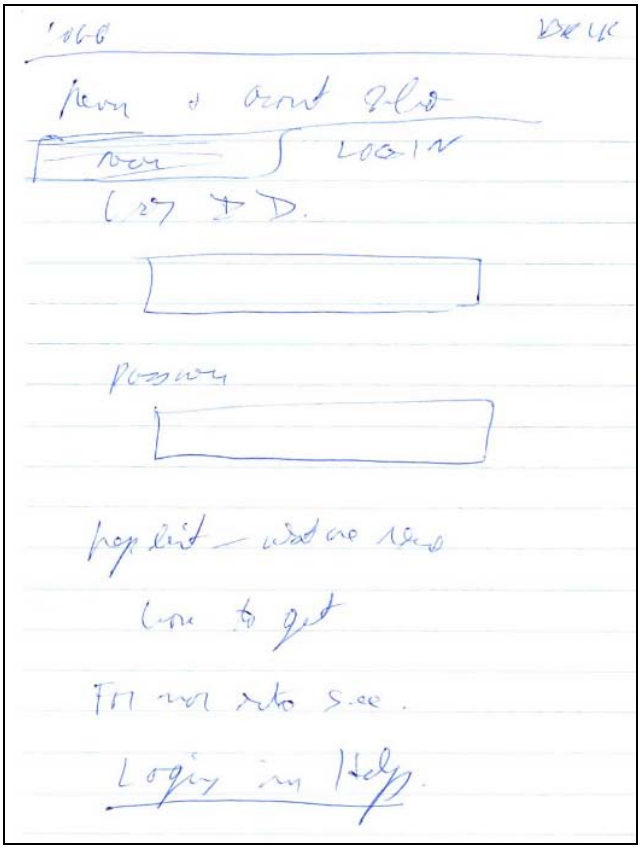
Another thought was to add a Recent option to the device's soft key menu. But this is not technically feasible, since our design involves a website rather than a mobile application. Late in the design process, an idea surfaced of adding a persistent "Recent" button to the global navigation at the top right of the screen. At this point, however much of the other designs were already complete, and adding this button would have put us behind schedule. Therefore we flagged

The second tab will be dynamically labeled: "Log In" if the user is not authenticated, changing to "Account Info" after credentials have been accepted.

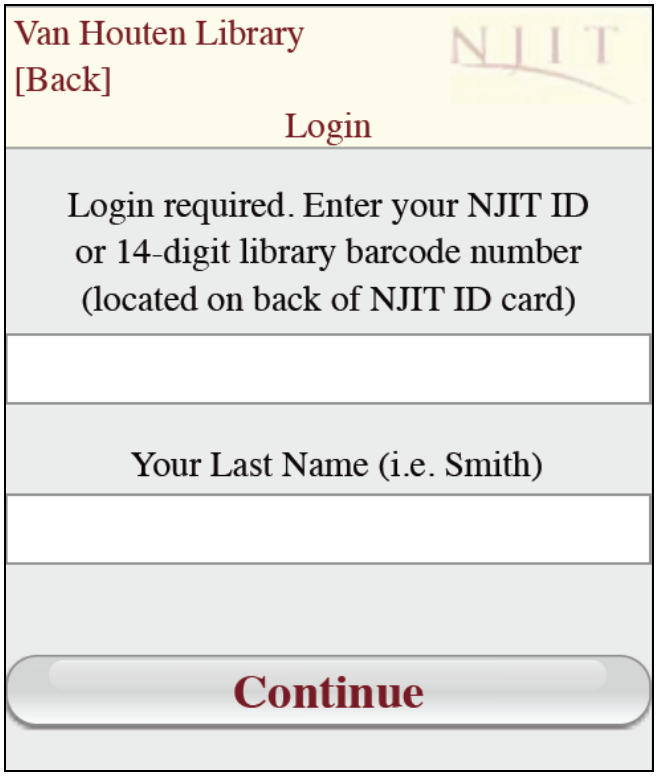
> **Note**: The eResources (for databases) and Reservations sections will also require authentication.
>
> These should be all be handled in a sign sign-on environment; within the same session, authenticating in the My Research section should automatically do the same for the eResources and Reservations sections (and *vice versa*).

The Log In tab displays prompts for user ID and password, with embedded tips to help users orient to the appropriate ID syntax (following best practice guidelines for security):

Wireframe:



Resulting Mockup:

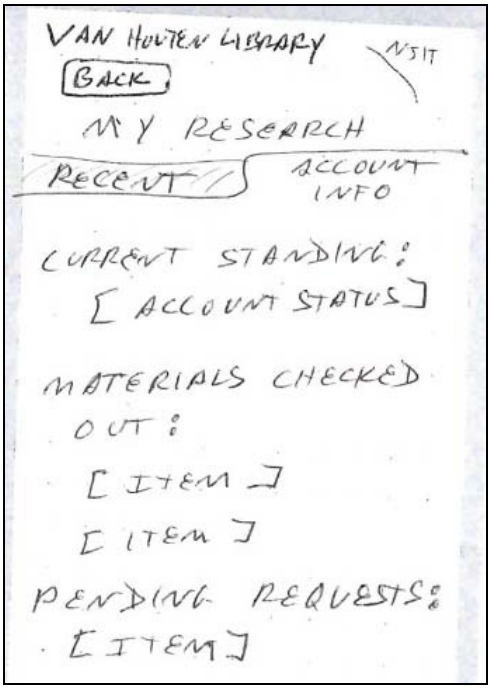


If a login fails, advice for resetting passwords and requesting an account will display.

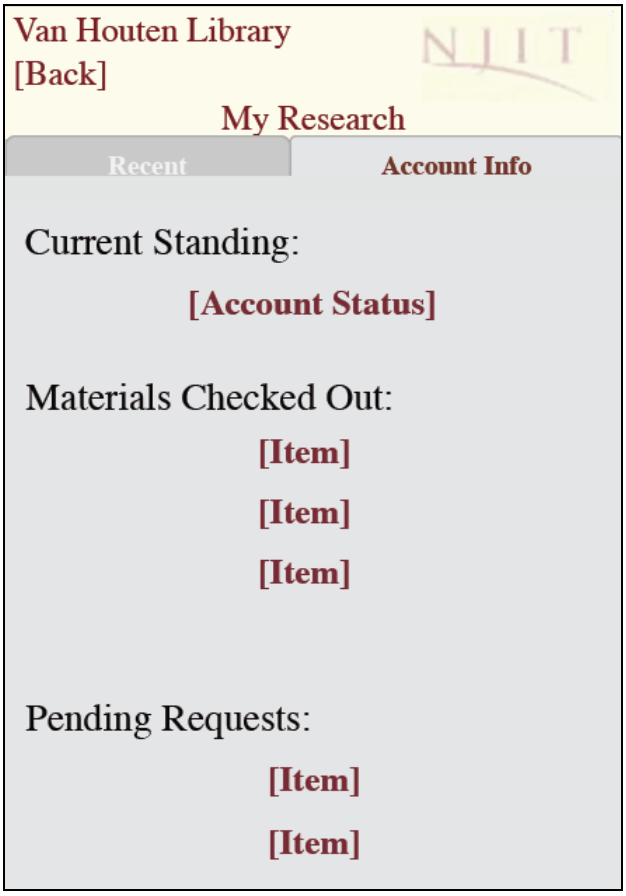
The Account Info tab will display user-specific information such as:

- Current standing
- Materials checked out
- Pending requests
- Pending reference questions.

Wireframe:



Resulting Mockup:



Two items considered but not included are saved searches and bookmarked items. Since this would first require expansion of the eResources section, they were dropped due to time constraints.

5.3.6 Ask a Librarian

This feature is an enhancement of options already offered by the Van Houten Library. The first page of Ask a Librarian offers a list of options for reference from a librarian. The upper half of the page presents the content on the right side of the page, while the content at the bottom is shifted towards the left side. The reason for this is to avoid overwhelming the user with content and divert their attention towards strategic points. Thus, the right side offers information on the hours when the Research Help Desk is normally available according to the academic term.

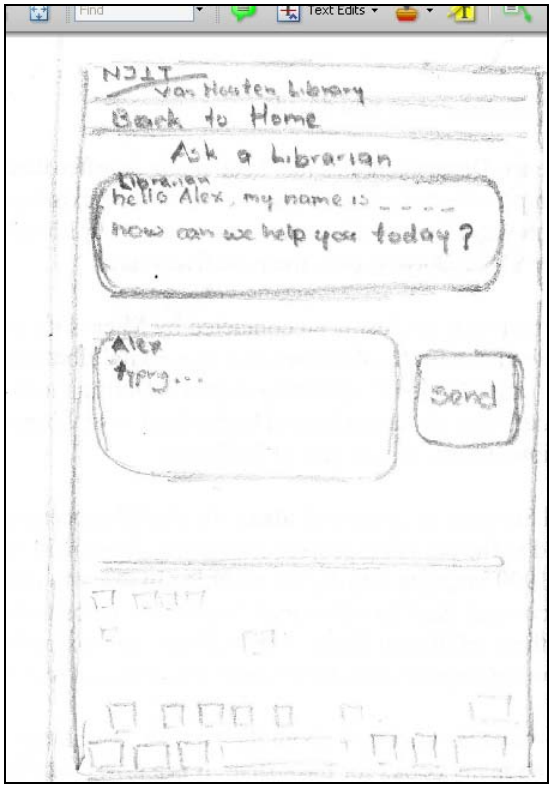
The second portion of the page offers a series of features, each of them with its own way of accessing. For example, phone, text options, and email are given a quick link that will allow the user to immediately access this feature.

The Chat with Us option takes users to a different page that displays the availability of the chat service. A single button on the middle of the page lets the user know whether the service is online or offline. If the service is offline, the button will look grayish and the user will not be able to tap on it. If the chat is operating, then the button will display "Online" in burgundy color:

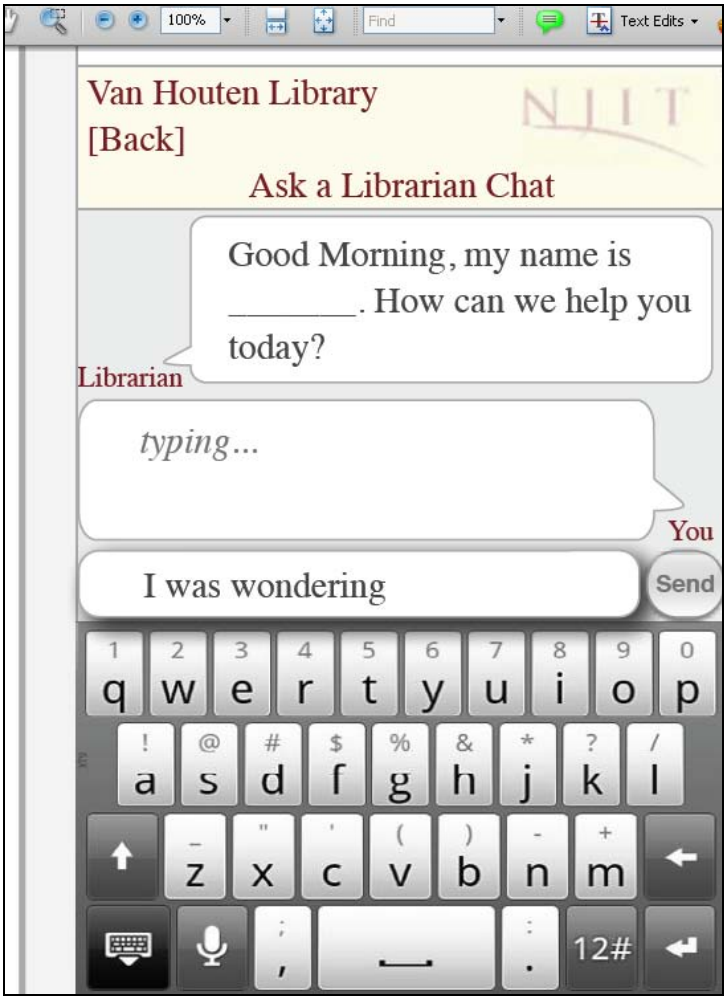
(Note that there is nothing on the full size Van Houten Library website that indicates that the chat service hours are different that the reference help desk hours.)

The chat feature itself is one of the most important components of this design. The page displays the conversation in bubbles aligned to opposite sides of the page in order to allow the user an easier recognition of what is being said and by whom:

Wireframe:

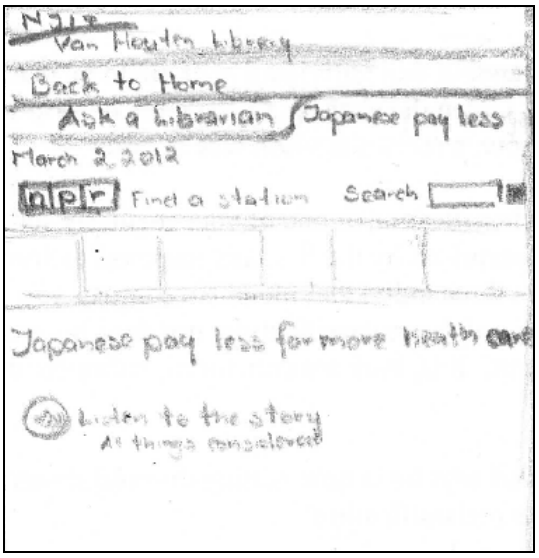


Resulting Mockup:

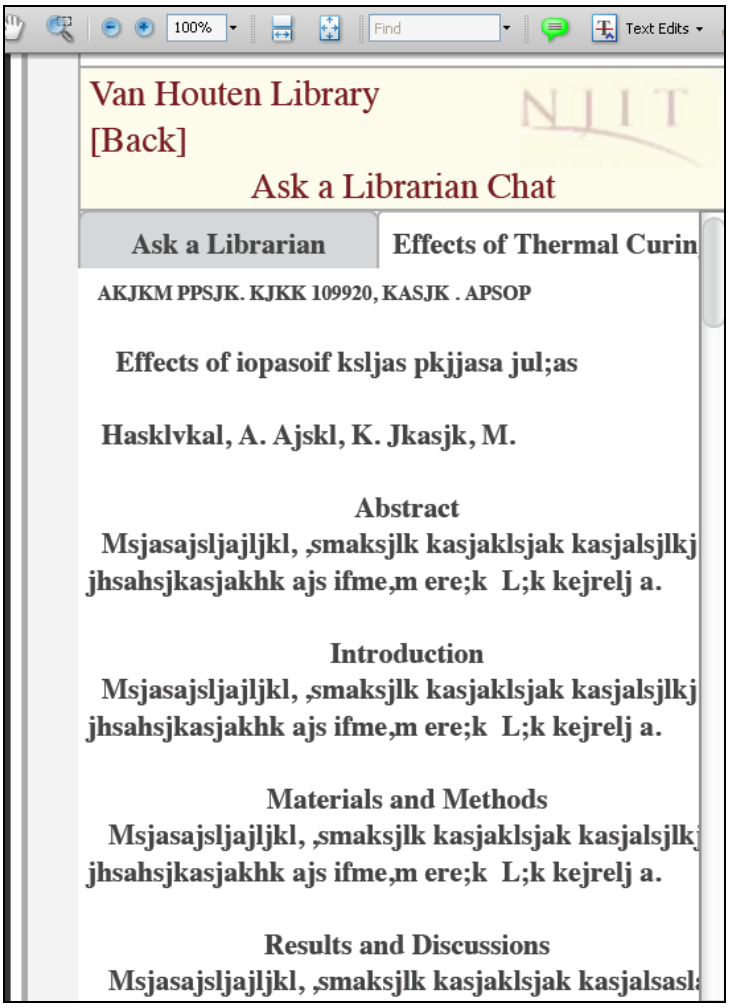


When a link is provided by the librarian, the linked page opens in a tab on the current page. In this way, the user can take a quick look at the page, decide if it is of use or not, and communicate this to the reference librarian. The user can bookmark the page or simply close it and go back to the chat:

Wireframe:

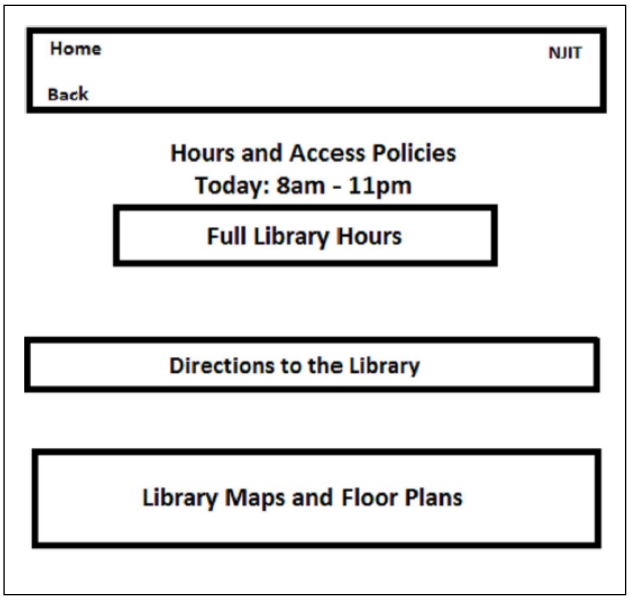


Resulting Mockup:

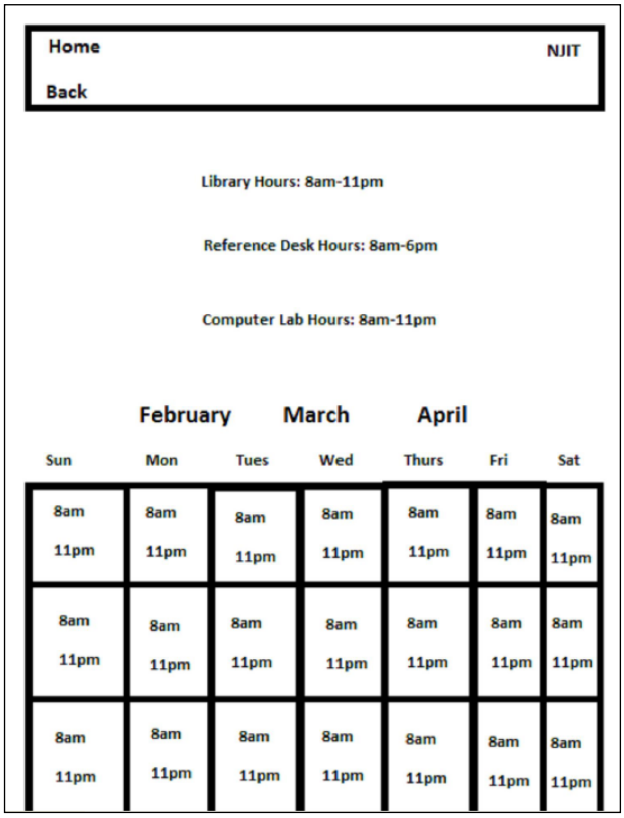


Finally, in addition to the common chat-log email sent by many chat reference services, once the chat session has concluded, the user will be given a summary of all references provided during the chat. This feature allows the user to avoid reading the entire chat in order to find a specific reference, thus reducing the effort of locating source after source:

5.3.7 Visit Us



This feature displays library location and access information. Designing this feature went through several iterations. Initially we had planned to include a live map of the library with the user's location marked, updating as each user moved about the library, making locating themselves quite easy. However, this feature was scrapped due to a few technical limitations. First, our decision to use a mobile site as opposed to an app limits the phone's ability to retrieve location information from the mobile device, depending on the user's permissions, browser, and device. Second, GPS positioning, the most common location service, does not function well indoors, and would be unable to grant the fidelity necessary to make this feature useful, as being off by several dozen meters would not help a patron looking for a specific section of the stacks (Obtaining User Location, 2012).

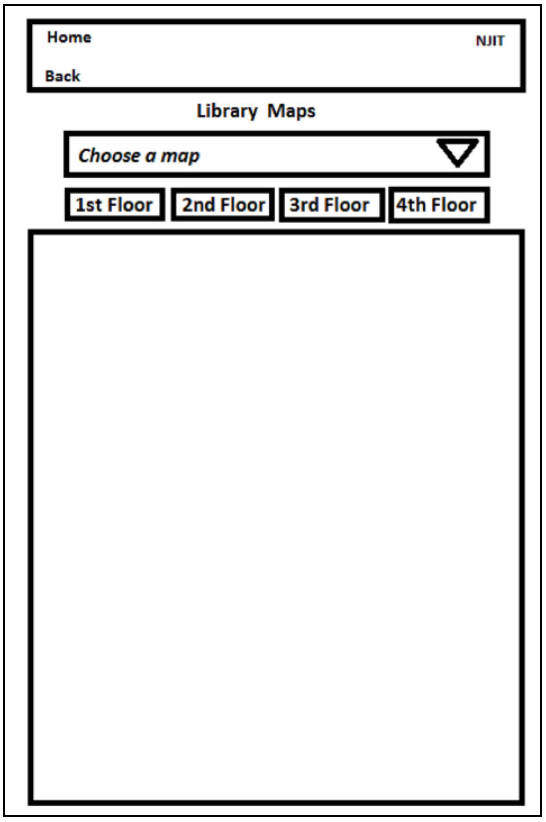


Designing this feature also led to several forms of redundancy. First, the hours information is duplicated in the "Ask a Librarian" section of the site. This was judged an acceptable duplication, as users could reasonably expect to find that information in either place, and so representing it in both pages makes sense. While the information is present in two different pages, it is vital to have both pages retrieving date and hours information from the same database location, to avoid any conflict of information between the two pages.

Designing the internal maps initially led to several pages containing maps of each type, displaying call numbers, classrooms and computer labs, and study rooms. This design led to an excess of pages and navigation by the user.

To consolidate the excess navigation, the final design contains a single map object and a dropdown list that allows the user to easily select the information they are seeking, which will then be displayed and highlighted on the page:

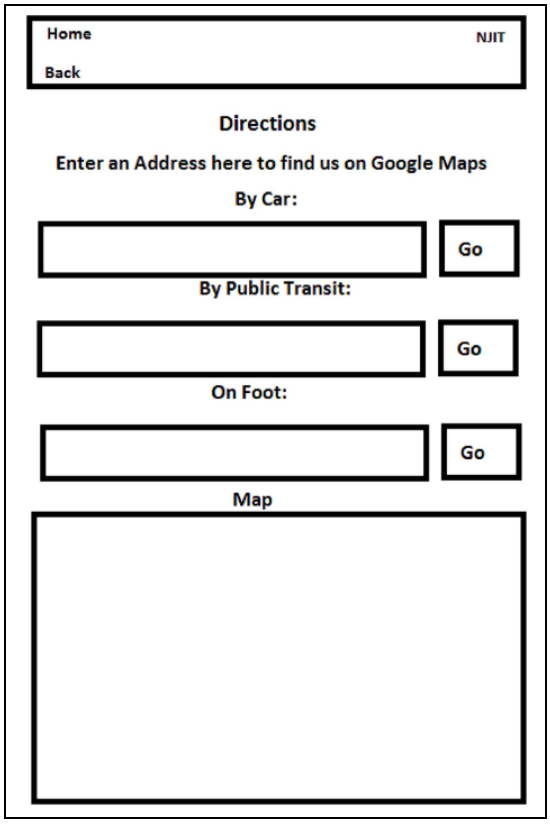
Wireframe:



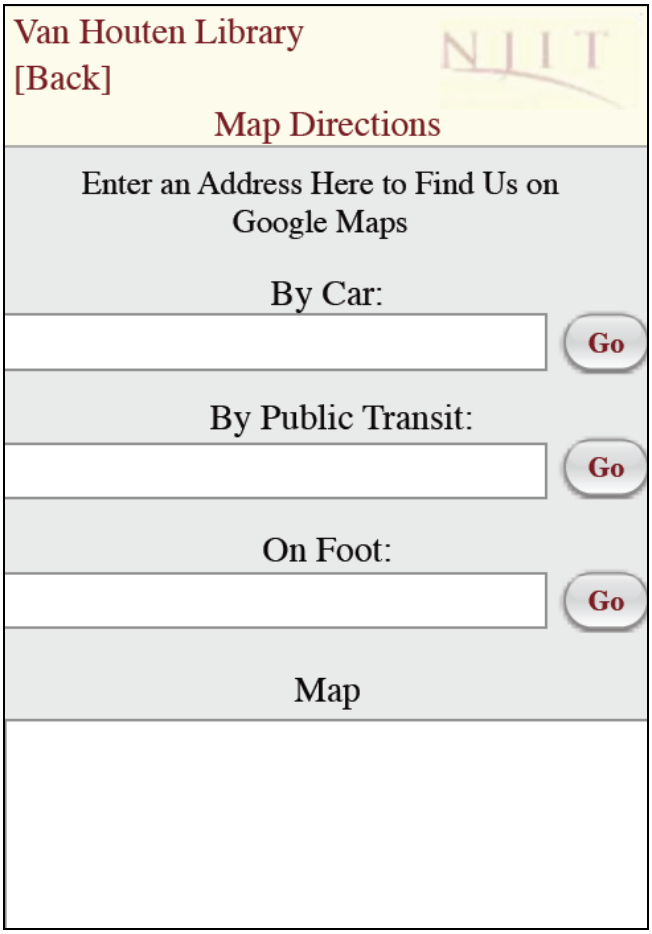
Resulting Mockup:

The external directions to the library makes use of Google Maps, and simply asks the user to enter a location and hit "Go", at which point the maps will display below:

Wireframe:



Resulting Mockup:

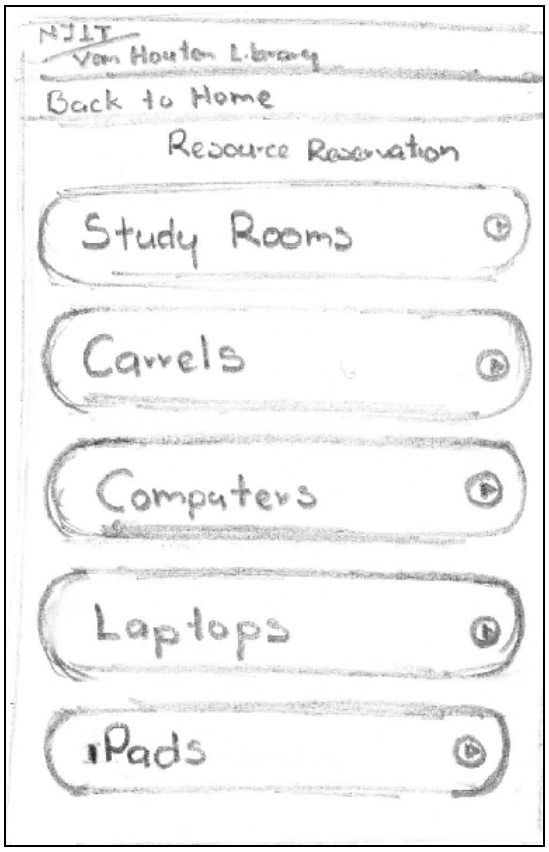


Clicking the map will open Google Maps in a browser, or if the user has a Google Maps app, it will open in that instead. If the app is present, opening the Maps application will automatically enter the library's address information and prompt for a starting location if one was not given in the earlier form.

5.3.8 Space & Equipment Reservations

The Space & Equipment Reservation feature experienced a series of adjustments focused on developing an intuitive feature with the least amount of clutter. The first thing to notice in this page is the hyperlink to the Reservation Policies. This takes the user to the main Policies page within Library Info:

Wireframe:



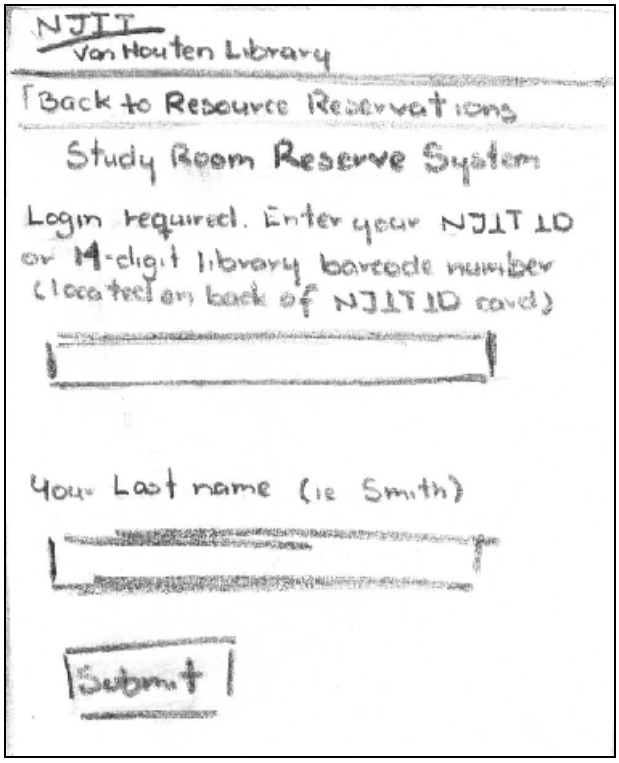
Resulting Mockup:

The idea behind having a hyperlink, instead of a full description of the policies, is that it reduces the amount of content and places a greater emphasis on recognition of the services that the user may be looking for.

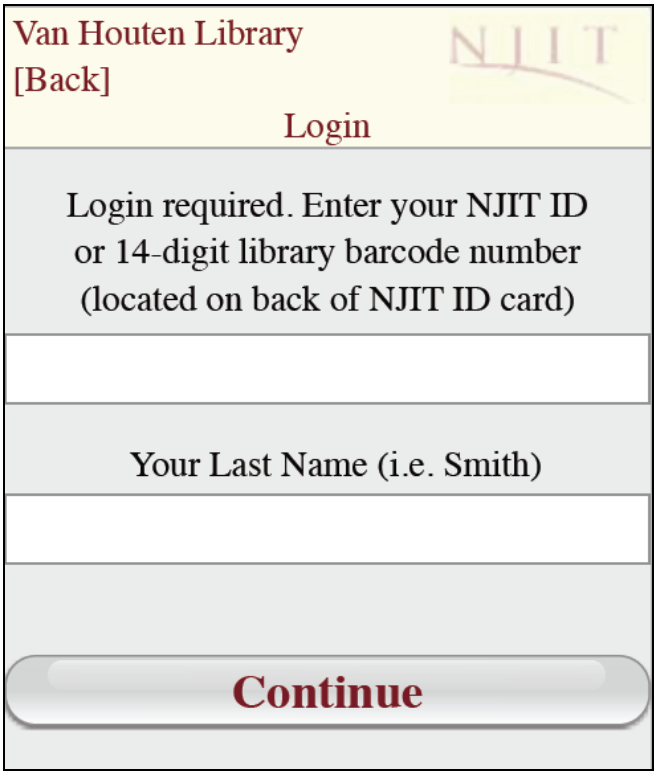
Below the link, the page displays three main services, Study Rooms, Carrels, and Portable Devices.

If the user logged in before getting to this point, there will be no need for re-typing anything to begin a reservation. On the other hand, if the user has not logged in, a Log In page will display once a service is selected. Like NJIT's current login page, the mobile version asks for the 14-digit number located on the back of the NJIT ID card, as well as the user's last name:

Wireframe:



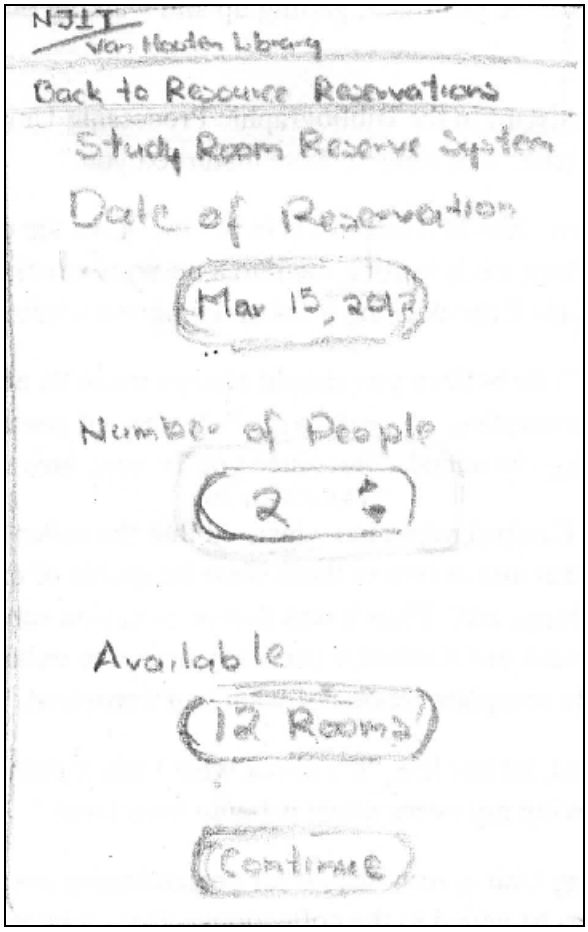
Resulting Mockup:



Note that similar login pages are used in the My Research and eResources sections.

Each type of reservation page prompts for information, then describes which or how many items or locations are available. For example, in order to reserve a study room, the user must provide specifics on how many people and for how long will the study room be needed. The page will then indicate how many rooms are available:

Wireframe:

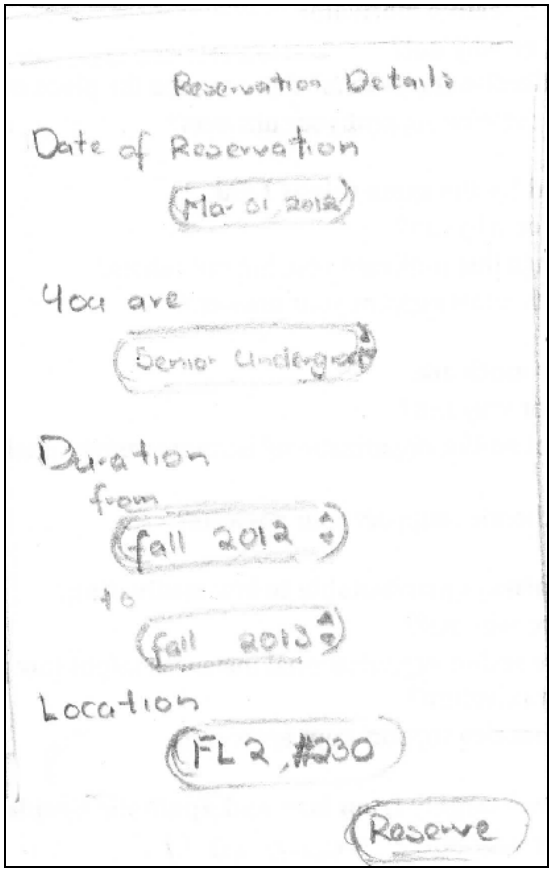


Resulting Mockup:

For the reservation of carrels, the information needed is quite similar, except that is classified under a different descriptor. The user will have to specify their current enrollment status, undergraduate senior or graduate. This has been reduced to two categories based on the common practice of Colleges and Universities offering carrels only to their senior undergrads who normally will have to write a thesis on their senior year.

Once this category has been specified, the user can chose the terms when the carrel will be needed. In response, the page lists the floors within the library in which there are carrels available for that particular time period, as well as the ID number for the carrel. The reason for this is that once the user knows which carrels are available, they can take a look at the floor plan to locate the exact location of the carrel:

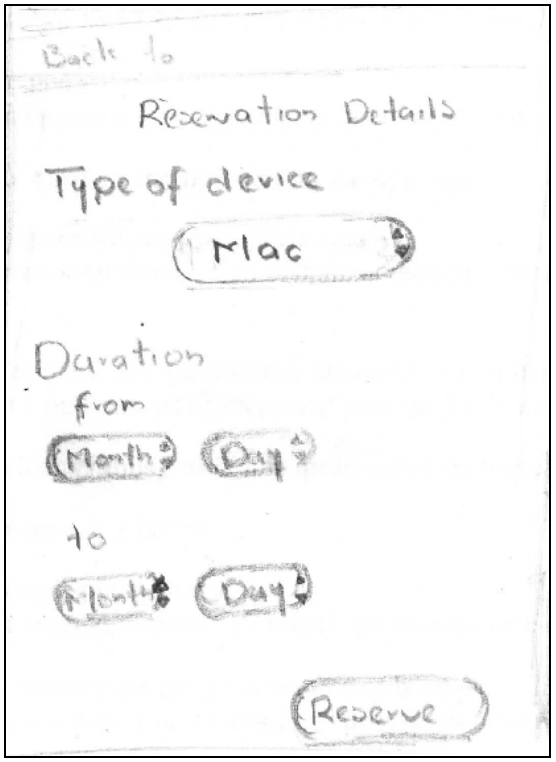
Wireframe:



Resulting Mockup:

For portable device reservations, users may choose from four main devices: Mac, PC, iPad2 and Amazon's Kindle. Here we have created a shortcut displaying how many devices are available as soon as the user chooses the type of device:

Wireframe:



Resulting Mockup:

We have done this because although the user must specify for how long they will need the device, the policy for each of the items will vary. Also, there is always the possibility of loopholes regardless of the time stipulated in the reservations policy.

6.0 Lessons Learned

Through participation in this project, our team members have experienced the user-centered design (UCD) process first-hand.

We've seen how assumptions based on a personal perspective do not necessarily lead to effective design choices. The iterative approach of preparing, evaluating, and refining series of low-cost wireframe sketches – in coordination with potential users – is a more reliable path to well-considered designs that fulfill users' needs.

We also learned the value of thoroughly researching users' needs before finalizing requirements and beginning design work. The value of this research is especially clear to us since parts of our research were "satisficed" due to circumstances. While we did the best we could to inform ourselves, in the absence of specific input from NJIT students, we second-guessed certain decisions. If we had found a way to expand our research to include more thorough input from the actual community of potential users, design decisions could have been made with more confidence.

Before development begins on this website, we recommend an intermediate round of research directly with NJIT students. Polling about mobile research needs and some focus groups to review the proposed design could help fine-tune the design and ensure it is tailored specifically for NJIT students.

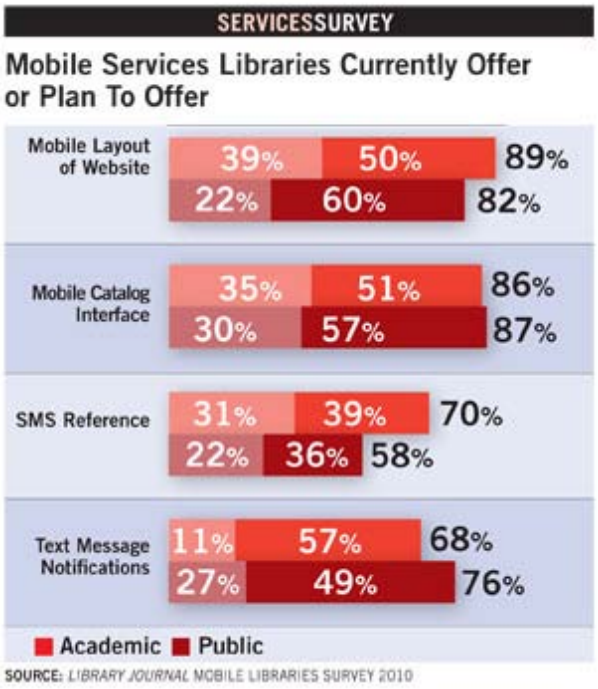
In continuation with the UCD philosophy, once the site has been developed and published, we recommend sending a short follow-up survey to new site visitors, to collect information about which aspects of the design are working well, and which should be revisited in the next development cycle.

7.0 Appendix

7.1 Supplemental Research Findings

The majority of academic libraries (65%, including community colleges, undergraduate colleges, and graduate/professional institutions, see illustration) “currently offer” or “plan to offer” services to handheld devices (see chart, p. 31). Priority services include mobile layout of the library’s website, mobile catalog interface, SMS reference (reference assistance via text messaging), and SMS (text message) notifications. Of these, 39% of academic libraries currently offer a mobile-friendly library website, and slightly fewer (36%) offer a mobile-friendly catalog. Ideally, a mobile library website would lead seamlessly to a mobile library catalog, and a correlation between these figures may be surmised (though no explicit correlation was explored in the survey). Of those libraries not presently offering a mobile website, mobile catalog, or text message notifications, approximately half indicated that these services were being planned. Two-fifths of respondents in this group indicated that SMS reference services were being planned.

Among public libraries, more than half (56%) “currently offer” or “plan to offer” services designed for mobile users:



Public libraries, like their academic counterparts, identified mobile catalogs (57%) and websites (61%) as the leading handheld services planned, though they lag behind in current implementations (22% and 30% for mobile websites and catalog interfaces, respectively)" (Thomas, 2010)

According to a Pew study, "Mobile Access 2010," mobile phone owners are now likely to use their phones in a greater variety of ways. The following table lists these different activities and also compares given figures to the same point of time in 2009" (Krishnan, 2011):

Activity	2009 %	2010 %	Percentage increase
Take pictures	66	76	10
Send or receive text messages	65	72	7
Access the internet	25	38	13
Play games	27	34	7
Send or receive email	25	34	9
Record a video	19	34	15
Play music	21	33	12
Send or receive instant messages	20	30	10

7.2 Survey

The survey consisted of these questions:

1. Which academic library's website do you use most often?

   _____

2. What role best describes you when visiting this website?
   - o Student
   - o Faculty
   - o Alumni
   - o Library Staff Member.
3. What do you do on the website? (check all that apply)
   - o Search for books and other materials in the catalog.
   - o Search for journals and articles in a database.
   - o Submit reference questions.
   - o Request digital copies of print materials or inter-library loans.
   - o Look up hours, policies, or contact information.
   - o Other (please specify)

   _____

Note: The options for this question were displayed in random order.

4. Approximately how often do you use a cell phone to access your library's website?
   - o Daily
   - o Weekly
   - o Monthly
   - o Less than Monthly
   - o Never.

5. How difficult or easy is it to find things on the website?
   - o Very easy
   - o Somewhat easy
   - o Somewhat difficult
   - o Very difficult.
6. What improvements or new features would you like to see on the website?

   _____

7.3 Survey Results

Table 1 Survey Question 1: Website Used

Library Name	# Responses
Bucks County Community College	1
Drexel Libraries	8
Fanwood - Scotch Plain	1
Penn Libraries	5
Somerville Public Library	1
Texas A&M International University	1

Table 2 Survey Question 2: Role on Website

Role	# Responses
Student	13 (76.5%)
Faculty	0
Alumni	0
Library Staff Member	0
Community Member	4 (23.5%)

Table 3 Survey Question 3: Website Activities

Activity	# Responses
Submit reference questions	1 (5.9%)
Search for books and other materials in the catalog	13 (76.5%)
Search for journals and articles in a database	13 (76.5%)

Activity	# Responses
Look up hours, policies, or contact information	7 (41.2%)
Request digital copies of print materials or interlibrary loans	6 (35.3%)
Other (Various responses)	4 (23.5%)

Table 4 Survey Question 4: Cell Phone Usage

Frequency	# Responses
Daily	0
Weekly	2 (11.8%)
Monthly	0
Less than monthly	3 (17.6%)
Never	12 (70.6%)

Table 5 Survey Question 6: Desired Improvements

Grouping	Response Text
Search Enhancement	Search for books like we search on google! (not having to specify authors, book title, etc in separate forms)
Search Enhancement	[continued] enhanced searching capability, including: format of material, rating by other users, distance to holding library search of all holdings of the library and associated libraries...
Search Enhancement	[continued] suggestions for similar material...
Mobile Presence	a mobile version of the website would be helpful. Usually I just hit the site's main page by doing a google search for "BCCC library".
Mobile Presence	Mobile Version
Personalization	easy maybe because I already know where to get the things I need. The research guides are especially helpful - if I get stuck I'll usually find what I need there. It might be nice to have a history of items that I have recently searched for / viewed.

Grouping	Response Text
Personalization	browsable history of materials borrowed... e-mail notices when materials are due...
Course Reserves Enhancements	I'd like to be able to access my current digital course materials without having to search for them in the library's website. Some professors have it set up to find the course and professor name, then the digital resources for that class (& quarter) are available in a list on Hagerty, but many of my professors just provide a list in the syllabus leaving me to search for each one and taking up valuable time each week.
Database Access Enhancement	[continued] I think combining the databases, so you can use them all at once would be useful.
Online Reference	[continued] asking reference questions online asking usage questions online online access to pdf versions of materials
Holdings	Larger selection of ebooks.
Technical Difficulty	Sometimes the site tells me I can access an articles, so when I click the Get It button to access it, it tell me it actually isn't available. I think these should be accurate. Also, I like the article look up...
Technical Difficulty	Penn's library search function is very slow, and the main website is often down.
Commentary	I mainly use the website to access subscription databases or electronic resources so it's simply a means of authentication.
Commentary	Additional features designed for remote/online students.

Note: Grey shading indicates out-of-scope items.

7.4 Wireframes & Mockups

Please see attachments:

- Group2_ConceptSketches.pdf
- Group2_Wireframes.pdf
- Group2_Mockups.pdf.

7.5 Team Process & Organization

During the project, our team used email for quick communications while using a private discussion form for in-depth discussions and a file repository. In addition, the team met over the phone weekly.

7.5.1 Roles & Responsibilities

All members contributed ideas and participate in design activities. But each of us took the lead in certain areas, to ensure that all aspects of the project description are addressed.

- Project Manager & Documenter – Karen

  Draw out a schedule and help us stay on track. Outline, assemble, & polish the final report.

- Researcher & Business Analyst – Elisa

  Research existing literature. Solicit input from potential users.

- Modeler & Prototype Developer – Eric

  Prepare diagrams and workflows. Create mockups / prototypes as appropriate.

7.5.2 Project Phases

As is typical, the tentative project plan created at the beginning of the project evolved with the project. (Please see attachment: Group2_ProjectPlan_TENTATIVE.pdf.)

Ultimately, the project was completed in three phases. Appropriate sections of the final report were written during each phase.

1. Research Feb 7 - Feb 22

   In this phase, we'll review findings from Assignment 2, visit sample mobile sites, and solicit user feedback using surveys and card sorts.

2. Design Feb 14 – Mar 9

   Here, we used the results of Phase 1 to identify our "problem" and choose features that will support a solution. We then iteratively developed site features and information architecture

3. Integration Mar 10 - Mar 12

   This phase involved a review of feature designs, final refinements, and a walkthrough of the project report.

7.6 Enhancements Deferred to Next Release

- "Recent" button in the top right corner of all pages.

  This button would target the My Research: Recent page.

- Confirmation and reminder emails for submitted reservations.

- Saved searches and bookmarked items in eResources and My Research.

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