Human Factors International

# Results of Usability Testing of NLM Website
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# 1. Executive Summary

## 1.1 Background

Human Factors International (HFI), a leading usability and software ergonomics firm, was contracted by the National Library of Medicine (NLM) to conduct usability testing on the NLM site (www.nlm.nih.gov). NLM is gathering user data to serve as an informative baseline for a site re-architecture and redesign. To explore how test participants perceived and self-organized NLM-related information, HFI asked participants from three user groups -- general public, librarians and medical/research personnel -- to perform a card sort of items found on the current NLM site. HFI then asked participants to complete several relatively common user tasks on the NLM site.

This report describes the findings of the test sessions, provides insight into usability problems and provides recommendations for the next steps of the NLM site redesign.

## 1.2 Card Sort and Usability Testing

The tests represented task scenarios based on NLM's knowledge of the site's purpose and common user needs. In combination with the results from the card sort, HFI identified common user miscues, potential areas for correction, and general usability metrics.

HFI found that test participants:

- **Had differing approaches to organizing NLM-related information.**
    - Librarians had a distinctly different mental model for NLM information compared to non-librarians. Librarians tended to group items in a database-centric or similar manner and the names they assigned to groups tended to be much more database oriented.
    - Non-librarians used a greater number of conceptual distinctions than librarians. Also, the non-librarian names tended to reflect a much weaker orientation towards technical databases. Therefore, if the librarian-groupings were to be implemented on the NLM site, non-librarians would most likely have difficulty finding what they want among the menu options.
    - While librarian participants tended to have much more specific and technical expectations for site organization, they also benefited from a deeper understanding of library terminology and services. Non-librarian participants, on the other hand, did not have the background or experience to accurately interpret many of the descriptors associated with current NLM categories.
- **Were consistently familiar with basic information concepts, regardless of background.** For example, participants easily and accurately recognized "Health Information," "Library Services," "Catalog," and other basic concepts. However, participants tended to be less accurate and consistent in their interpretation of ambiguous labels such as "MeSH," "Gateway," and even "General Information."

- **Were positive about the breadth of functionality offered by the NLM site** but often led astray by the use of confusing or non-familiar terminology. Participants often made use of descriptors displayed below category headings such as "Health Information" or "General Information" on the NLM home page. They based their decisions of where to look in the site based on what they saw (or did not see). In many cases, participants found the categories sufficiently vague that they depended on the descriptors to provide additional context. The repetitive use of confusing terminology also frustrated the non-librarians in our test pool.
- **Were often puzzled by the current display of search results.** Although only a handful of participants completed searches on the NLM site during the test sessions, it was clear that these participants were puzzled by the non-standard use of folders and search result hierarchies.
- **Were often distracted by the abundance of text on most NLM pages.** While explanatory and supportive text usually is a positive site element, the sheer number of links and descriptions on many NLM pages appeared to hinder the performance of both librarians and non-librarians.

## 1.3 Recommendations

Based on the results of the usability tests, we make a number of recommendations for improving the site's content and navigation. These recommendations are based on our extensive experience with user-centric design, as well as established usability guidelines for software and Internet user interfaces.

The following is an overview of our primary recommendations. These and other findings are discussed in detail in the following sections of this report.

**Primary recommendations:**

- **Reorganize the site categories to accommodate the differences between non-librarians and librarians.** Future site categories should be self-evident and as unambiguous as possible, even in the absence of descriptors. See our specific recommendations for reorganizing NLM site categories in Section 4.6.3.
- **Rethink labeling that relies on the user's knowledge of technical library concepts, except where librarians and researchers will be the primary users** of this information (such as interlibrary loan information and MeSH). For example, if information is technical in nature, tell users so that they can easily decide if they need or want to look in that area. "Scientific & Medical Research" will most likely appear more technical than "Health Information," which will help researchers/librarians and non-technical consumers self-sort themselves.
- **Use transparent categories but still rely on cross-linking.** Due to the breadth and "relatedness" of the content provided by the NLM site, careful and consistent cross-linking will still be a requirement after the site reorganization.
- **Support standards for folder-based search result displays.** We have provided NLM with feedback on an iterated NLM modification to the search result screens and hope that this feedback proves useful and timely.

- **Reduce the amount of excessive text and user options provided at high levels of the site.** To keep users on task, we recommend that users not be inundated with a large number of options until they "drill down" closer to individual articles, search results, and descriptions of library services. On directory-style pages that list and describe the contents secondary or tertiary categories, we recommend adopting consistent copy editing guidelines to streamline descriptions and improve the relevancy of search results.
- **Consider a consistent site-wide reduction in overly similar or ambiguous terminology.** While we recognize that substantial effort may have been invested in the naming and branding of database services such as "MEDLINEplus," "LOCATORplus," "PUBMED/MEDLINE," and "MeSH," these names are sufficiently similar that they can be confused with each other (e.g. MEDLINEplus versus MEDLINE) or they are not sufficiently transparent (e.g. LOCATORplus, which is the NLM Catalog). In the long term, NLM may want to rethink the naming of these valuable resources.

## 1.4 Future Impact

It is a challenge to find a vocabulary suitable to the general public that also meets the needs of librarians, researchers, and medical personnel.

Despite the technical sophistication of the tools and information provided by the NLM site, each user – regardless of background and experience - must be able to easily and quickly select the appropriate items. Since much of this selection is based on the user's accurate perception of each item's relevance to their needs, sound user data is critical.

Self-evident categories, transparent labeling, minimal jargon, and uncluttered screens will go a long way in making the NLM site more usable and effective for all audiences. Iterative design and continued data gathering will also help the NLM site continue to evolve into an environment that facilitates positive user involvement, regardless of the user's background, vocabulary, or library experience.

# 2. Introduction

Human Factors International (HFI), a leading usability and software ergonomics firm, was contracted by the National Library Medicine (NLM) to conduct usability testing on a redesigned version of the www.nlm.nih.gov site. To the current project, HFI brought its expertise in usability testing and evaluation to help identify key usability issues affecting potential uses of the NLM Web site.

This report describes the findings of the test sessions, provides insight into the existing usability problems and provides recommendations for resolving them. This round of usability testing could also serve as a baseline for future usability tests of the NLM site.

# 3. Background on NLM Usability Testing

This section contains background on the October-November usability tests conducted on the NLM Web site, in the following order:

- **NLM Usability Test Background**
- **Participants and Methods**
- **Findings from the Background Questionnaire**

Throughout this report, numbers in parentheses represent the number of participants who provided that particular response.

## 3.1 NLM Usability Test Background

Between October 29 and November 5, 2002, HFI conducted usability testing on the publicly available NLM site in Washington, D.C at the usability lab at the Bureau of Labor Statistics (BLS) and at HFI's offices in Fairfield, Iowa. The sessions in central Iowa provided geographic diversity to the test pool of Washington participants. The identical test protocol was used for all test participants.

The usability tests were based on task scenarios derived from NLM's past knowledge of the site's purpose and common user needs. HFI designed each task to assess users' ability to navigate through the NLM interface and understand the types of information associated with each of the major site content areas.

Specifically, HFI conducted the usability test to answer these questions:

- How well does the NLM Web site convey a sense of the kind of content users can expect when they explore NLM's Internet sites?
- Does NLM's site-wide organization and navigation enable effective and efficient access to the content?
- Are users able to comprehend the NLM Web site content?

- How clearly do users understand the meaning of labels, links and site instructions?
- What groups do users create when clustering functions by intuited similarity? Do librarians match the groupings used by the general public and researchers?
- What are the usability metrics, such as task completion success rates, granting that the small sample size allows only the most general of inferences?

## 3.2 Participants and Methods

Between October 29 and November 5, 2002 HFI moderators Wendy Yee and Jeff Lees administered usability testing to 8 participants at the usability lab at the Bureau of Labor Statistics in Washington, DC and to 6 participants at the HFI office in central Iowa.

Participants were recruited by JR Research based on specific age criteria (30 and above, with test participants preferred in their 40's and 50's), language requirements (fluent English speakers), and Web experience (must have used the Web at least once before). None of the participants were NIH employees, software developers, or Web site designers. To gain a sense of how the NLM site met the needs of professionals, HFI recruited about equal ratios from three groups: general public (5), librarians (4), and medical or researchers (3 and 2 respectively).

All participants signed a consent form indicating their willingness to participate in the usability testing and to be recorded in video format for NLM reference purposes. These videotapes provide a visual record of the participants' actions and general comments.

Participants were tested one at a time, one moderator for one participant. Interviews and test sessions were conducted in the same room. Web tasks were conducted using the publicly available NLM site, http://www.nlm.nih.gov.

**Participants completed the following usability test components:**

- Background Questionnaire: All participants answered a series of questions on their age, occupation, level of education, time spent on the Web, prior exposure to the NLM site, and typical actions with health-related information.

- Card Sort: Participants were given a set of 45 cards with various site functions or anticipated functions. They grouped them into intuitively associated groups and gave each group a name.

- User Tasks: Participants were asked to complete a series of navigation-centric tasks on the NLM site. While the majority of tasks were generic, three tasks were specific for librarians or librarians and researchers. There were also two tasks that were specific for general site visitors. The tasks

were designed to test the effectiveness of the site's current navigation framework.

- Unstructured Feedback: Participants were then asked to provide general feedback/ comments/ suggestions about the NLM site based on their experience with tasks. Because many of the comments and suggestions were very similar in nature, we have consolidated these suggestions wherever possible.

### 3.2.1 Card Sorting Method

Participants received 45 cards which provided descriptions of an item on the NLM site. See Appendix B.3 for the complete set of phrases. Participants were instructed to group the cards according to their own intuition. They were asked to invent a name for each group.

We analyzed the sorts by using cluster analysis programs, EZ Sort and EZCalc, available to the public from IBM's usability site:
http://www-3.ibm.com/ibm/easy/eou_ext.nsf/Publish/410.
The results of each participant's sort was entered into EZ Sort and collectively analyzed with EZCalc. We conducted three cluster analyses: librarians, non-librarians, and all participants.

### 3.2.2 Usability Test Method

In the Web Tasks section of usability testing, each participant performed five to seven tasks as specified by the scenarios described in Appendix A. The Web Task questions were designed to reflect task scenarios on information gathering and where possible were worded to avoid using onscreen keywords.

Participants were scheduled one hour apart. The HFI moderator attempted to keep each test session to less than that time. The moderator explained the nature and purpose of usability test and explained to each participant that they would be asked to complete several tasks using the NLM site. (See the "Moderator's Guide and Usability Testing Protocol" document in Appendix B.) Each task scenario was structured with the expectation that each task could be completed in less than six minutes, with the expectation that participants would require substantially less time (2 minutes or less). During each test session, the HFI moderator recorded the participant's click path and number of clicks required to complete each task.

Throughout testing, the test moderator asked participants to discuss their expectations regarding the site and their responses to what they were doing and seeing. Participants were especially encouraged to think aloud as they progressed through each task to provide insight on their selections and choices while navigating through the site and attempting to complete their tasks.

HFI moderators also encouraged participants to suggest alternatives or possible solutions to usability issues that they encountered. HFI moderators used non-leading questions such as "What would make this easier for you?" or "How would you change this to make it easier?"

### *3.2.3 Usability Test Metrics*

We collated the test results in an Excel spreadsheet accompanying this document. Each task was analyzed to produce the following statistics, as explained here using Task 1 as an example. We give detailed comments on task performance and probable sources of errors in Appendix A. A summary account of design issues follows in Section 4.

| % Completed Task | % Failed or Difficult* | Failed task | Approximate avg. time** (SD)*** | Average clicks**** (SD) |
|---|---|---|---|---|
| 76.9% | 30.8% | 3 of 13 subjects | 4.4 min (3.4) | 4.8 (1.2) |

* **% Failed or Difficult** represents the percentage of participants who experienced a 'problematic outcome' on the task. Typically, 'difficult' is scored at 50% of 'OK'. In this study, however, we are diagnosing issues, plus we are using 4 librarians and 5 medical/research personnel who by virtue of their medical or professional training probably have a better chance of using the site than the general user. Thus, we suggest counting 'difficult' as a diagnostic outcome that merits attention the same as 'fail'—thus we score 'difficult' at 100% of 'OK' in this combined measure.

When considering a quality goal for success rates on a task, we might hope for 80% success (a 'B' score if applied to an academic test situation). This allows a 20% rate for non-success, or problematic outcomes. Using 'difficult' as well as 'fail' as non-success, we see that the 30.8% of participants in this sample task raises a diagnostic alarm.

In fact, five of the 10 tasks in this study have over a 20% problem rate (ranging from 31% to 80%).

Two additional tasks each have 33% problem rates, however, they only had a small number of participants, 6 and 3 participants respectively. Thus, we discount their problem rates because of the greater statistical uncertainty.

****Approximate average time** reflects informal monitoring of time. Consider it accurate to within about +/-30 seconds per participant. Also note that participants 'thought out loud' which could slow their performance. We expect that +/- 30 seconds accuracy averages out over the participants per task to reveal a reasonably useful assessment of average time on task.

*****SD** = Standard Deviation given in parentheses. This gives a measure of 'dispersion' of the constituent scores. For purposes of estimating the range of scores that covers about 66% of the participants, use the range from one SD above the average to one SD below

the average (+/- 1 SD). Thus, for about 66% of the participants who completed this task, their individual completion times ranged from 1.1 to 7.8 (4.4 +/- 3.4). We avoid using the 'range' of scores (minimum to maximum) because anomalous outlier scores unduly clouds the meaning of dispersion. .

****Average clicks** were derived only from tasks that were completed. We removed failed tasks from this average.

## 3.3 Findings from the Background Questionnaire

From the background questionnaires that all 14 participants completed, we determined that the majority of participants (62%) spent an average of 10+ hours on the Web per week and that 64% of the test participants had a graduate or medical degree. (Medical degree included RN, MD, certified nurse practitioner, etc.)

These statistics and others below suggest that the participants for this study are at least as well qualified as the majority of NLM site visitors. Thus, the results are probably conservative. That is, any picture of difficulties may be conservative, with less educated site visitors probably experiencing more problems than listed here.

All participants had already been screened to exclude NIH employees, software developers, and Web site designers, but we also verified that this information was consistent with information provided in each participant's background questionnaire.

### *3.3.1 Demographic Information*

78.6% of test participants were female; 21.4% were male. The average age was 44.5 years (Standard Deviation 4.88) and the median age was 45.5 years. The minimum age was 36; the maximum age was 53.

### *3.3.2 Breakdown by Occupation*

| Group | Occupation | Percentage |
|---|---|---|
| Medical and Research (35.7%) | Physician assistant<br>Nurse Practitioner<br>Assistant Director of Nursing | **21.4%** |
| | Researcher—genetic analysis<br>Psychology INFO analyst | **14.3%** |
| Librarian (28.6%) | Supervisory librarian<br>Library associate<br>Associate librarian<br>Librarian | **28.6%** |

| | | |
|---|---|---|
| General (35.7%) | Rep/advisor services specialist (financial planning industry) | **12.5%** |
| | Administrative support<br>Project director<br>Lobbyist | **21.4%** |

### *3.3.3 Amount of Time Spent on the Web*

Participants indicated that they typically spent the following amount of time visiting Web sites on an average weekly basis:

| | Percentage |
|---|---|
| Less than 30 minutes | **0%** |
| 30 minutes – 1 hour | **7.1%** |
| 1 – 3 hours | **21.4%** |
| 3-10 hours | **7.1%** |
| 10+ hours | **61.5%** |
| Declined to answer | **7.1%** |

Based on participants' comments, individuals who had frequent access to the Web as part of their occupation (usually in an office environment) tended to spend more time on the Web; 3 out of 4 librarians (1 declining) responded with the highest average Web hours, 10+ hours per week.

### *3.3.4 Highest Level of Education*

Overall, test participants tended to be well educated based on their indicated level of education.

| | Percentage |
|---|---|
| High school or GED | **7.1%** |
| Associate degree | **7.1%** |
| Bachelor's degree | **21.4%** |
| Graduate degree (MS, Ph.D., MBA, J.D.) | **50%** |
| Medical degree (MD, RN, certified nurse practitioner) | **14.3%** |

### *3.3.5 Participants' Previous Opinion of the NLM Site*

50% (7) of the participants had visited www.nlm.nih.gov site prior to their test session. (This was not a criterion that HFI had screened for, but was instead coincidentally a common factor among test participants.) 6 of 7 gave a good opinion of the site ("very good, large, professional", "efficient, clean looking, fast response", "excellent", "OK", "good" and "well organized". The other 1 gave no opinion.

The seven NLM visitors gave these reasons for their visit…

- Researching a medical term and topics
- Research business – library catalogs
- DOCLINE for illness
- Work
- Recommendations for preventative health maintenance
- MEDLINE searching

### *3.3.6 Typical Use of Information*

Participants were asked to select and rank actions that applied to their specific use of health-related information that they might find on the Web. "1" corresponded to the top-ranked action, "2" to a lower rank, "3" to an even lower rank, and so on.

The average rank of the actions selected by test participants is listed below. (Average rank was calculated by adding all the ranks assigned to any one action and dividing by the number of participants who had selected this action.)

A smaller number (e.g. 1) corresponds to a higher ranking, while a larger number (e.g. 4) corresponds to a lower rank. Participants tended to rank only up to the top 4 out of the list of 7 pre-named actions. Owing to the small number of participants, weighted average ranking was not used, as it would be misleading. Instead, we list the number of participants per ranking event.

**First Tier:**

- Pass information along to patrons or patients – **Average rank, 1.00 (5 participants put this in top rank)**
- Share with students or researchers – **Average rank, 2.00 (2 put this in the 2nd rank)**

**Second Tier:**

- Prepare for a meeting with a medical professional – **Average rank, 2.33 (3 put this in 2nd and 3rd ranks)**
- Pass along information to family or friends – **Average rank, 2.5 (9 put this in 2nd to 4th ranks)**
- Use information to help a family member or friend make a medical decision – **Average rank, 2.71 (7 put this in the top 4 ranks)**
- Learn more about a particular medical issue or condition –**Average rank, 2.78 (13 put this in the top 3 ranks)**

**Third Tier:**

- Learn about wellness issue – **Average rank, 3.33 (3 put this in the top 2 ranks)**
- Other uses ("prepare for licensing exam") – **Average rank, 4 (1 put this in the 4th rank)**

# 4. Findings from the Card Sort

## 4.1 The Issue of Site Design Bias

One of the goals of this study was to investigate the impact of different mind-sets on any possible future design of the NLM site. Design in this case refers to vocabulary used to describe features and functions, otherwise typically known as 'information architecture'. Given the predominant availability of professional librarians to aid in future designs of the NLM site, we conducted a 'card sort' to determine if a bias might be introduced by the librarian 'mind-set' that would differ from non-librarians. We studied three groups: librarians (4 persons), general public (5 persons), and medical/research professionals (5 persons).

The following sections contrast the 'mental model' expressed by librarians in their card sort with the mental model expressed by members of the other two groups (non-librarians).

As we shall see demonstrated by the data, indeed librarians tend to have a more technical mental model than non-librarians. The implications of this different mental model will be explored below and in recommendations for future NLM Web site design approaches.

Specifically, we recommend avoiding the technical bias introduced by the librarian mental model. We recommend adopting a less technical approach to future NLM Web site 'information architecture' by using terminology and concepts more meaningful to the general public—namely terminology that expresses benefits to the user. For the librarian or other knowledgeable professional, technical terms (like MEDLINE, Lonesome Doc) can be made available in a special index, search, and as parenthetical additions to generic terms.

## 4.2 Grouping Performed by Librarians

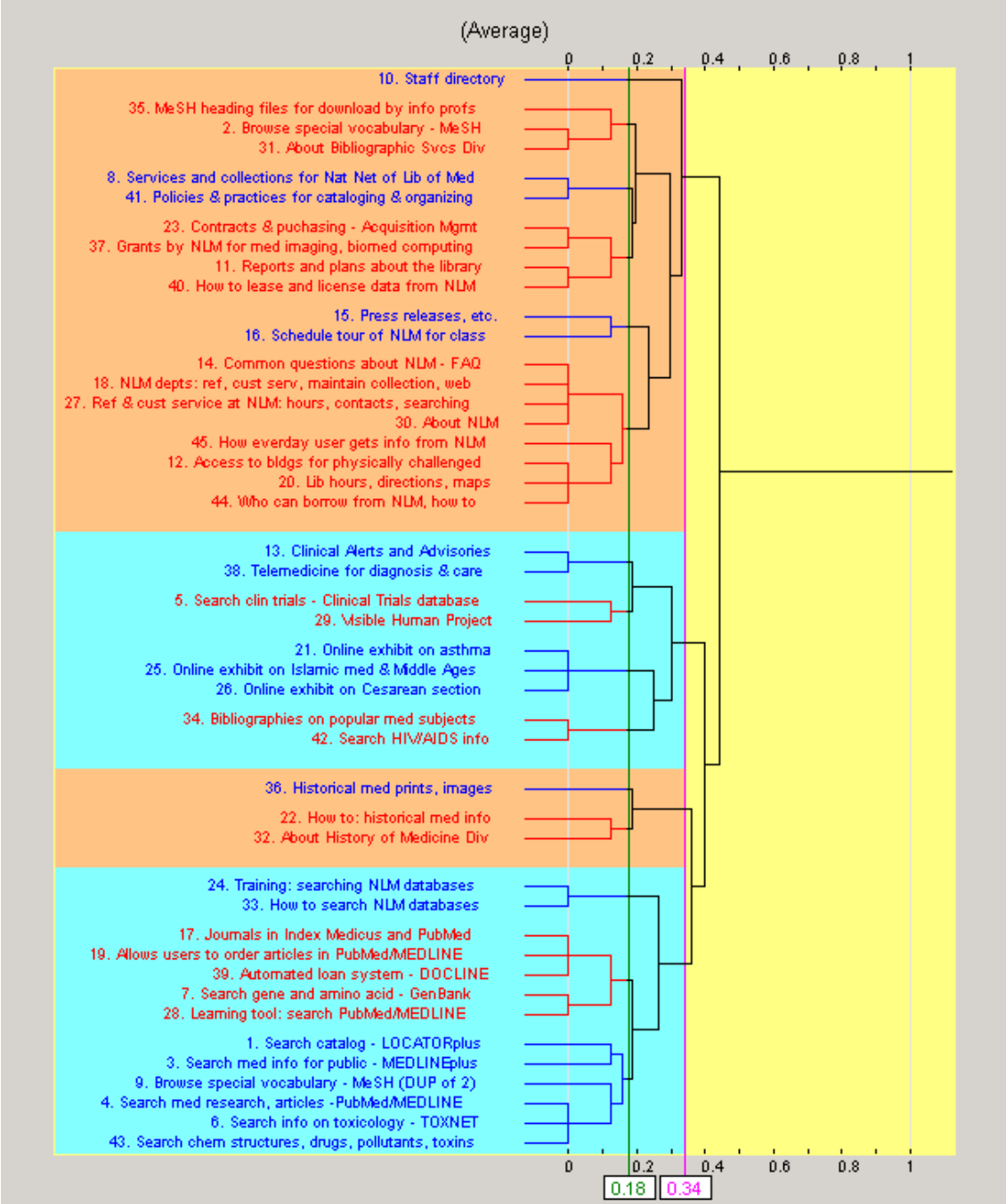
Here we report the names of the groups given by each librarian.

We can see the bias of the library mental-model in the group names given by the 4 librarians. The naming conventions given here reveal a database-centric approach to grouping. We attempted to place similar groups in the same column or adjacent to an associated column. Numbers in parentheses indicate the number of cards given within that group. We will contrast these naming conventions with the non-librarian public below. In general, the librarian group names are much more database oriented than the group names given by the non-librarians.

| Subject role | Research | Research | Research | Simplified | General | General | History | Exhibits | Professional | Professional |
|---|---|---|---|---|---|---|---|---|---|---|
| Librarian 4DC | | Reference questions: How to find specific information (9) | | How to search or use online products (16) | | General information about: reports, services, collection arrangement (17) | | Informational: online exhibits (3) | | |
| Librarian 8DC | | NLM databases (18) | MedlinePLUS (3) | | | NLM info (20) | | Online exhibits (3) | | |
| Librarian 7DC | | NLM databases (14) | Info for professionals (11) | | Hot topics (7) | Visitors guide (9) | | | | |
| Librarian 6DC | Research: access to holdings (14) | Research: in depth, what we're doing type areas (9) | Basic info: researcher public (7) | Research: how to's (4) | Basic info: curious public (3) | Basic info: gen'l public (8) | | | | |

Custer analysis of the groups revealed 15 subgroups. The subgroups represent clusters resulting from a mathematical amalgamation of the groups set up by the 4 librarians.

See the 15 subgroups in the chart below. The subgroups appear as alternating red and blue text.



## 4.3 Grouping Performed by Non-Librarians

Where possible, we placed the group names used by non-librarians in the same columns of topics used by librarians. Additional columns were needed, plus non-librarians used more group names than librarians. This analysis of group names indicates that librarians utilize fewer groups to describe their card sorts (average of 4.75 groups per participant) when compared with the non-librarians (average of 7.4 groups per participant).

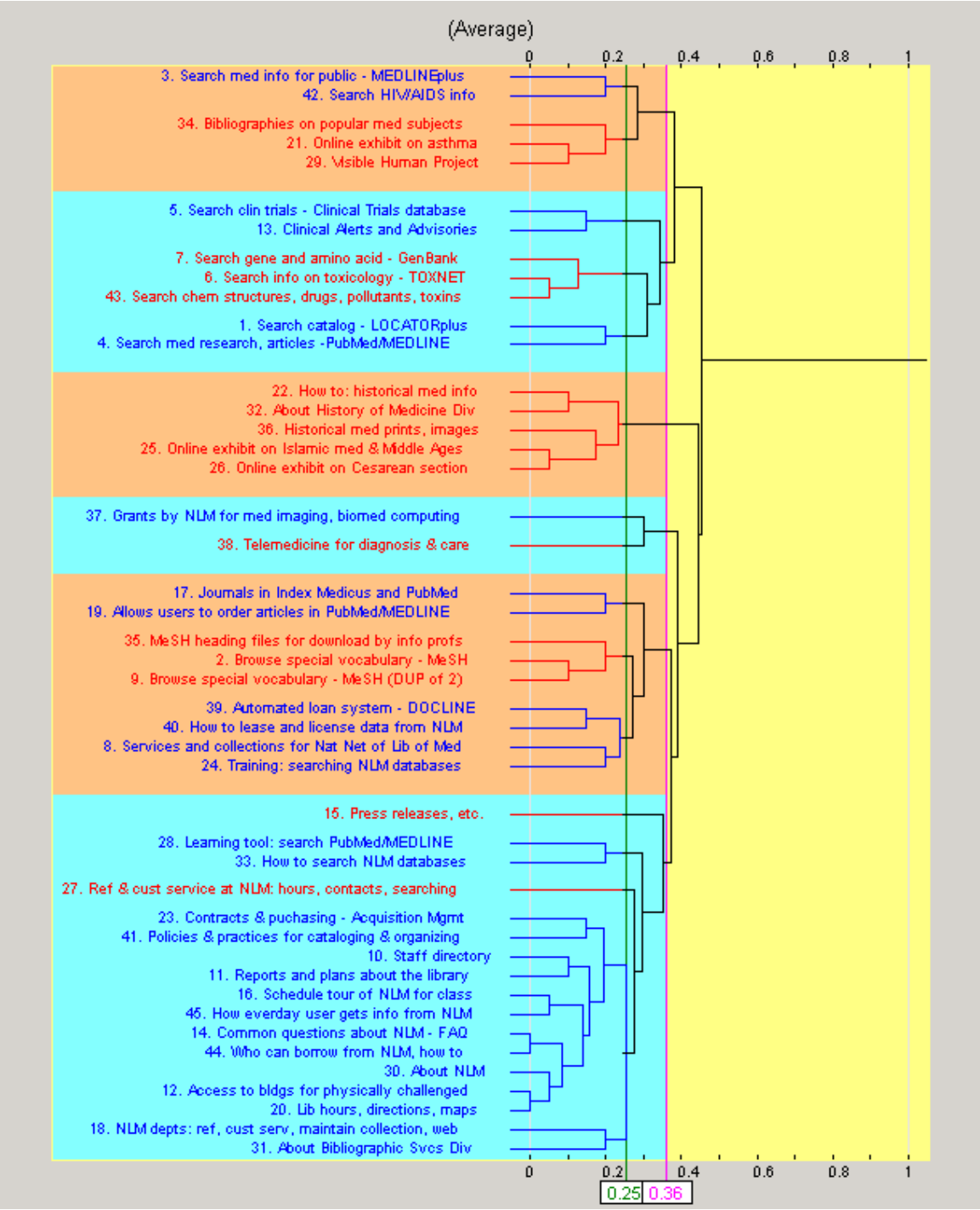
This difference is statistically significant ($p=.03$) in the sense that this difference would not be expected by chance in more than 3% out of 100 similar comparisons. Much research in psychology only requires that no more than 5% out of 100 similar comparisons could happen by chance. Thus, these differences fall within reasonable scientific rigor.

This finding implies non-librarians use a greater number of conceptual distinctions than used by librarians. Also, the non-librarian names tend to reflect much less orientation towards technical databases. Thus, if the librarian-groupings were to be implemented on the NLM site, non-librarians would most likely have difficulty finding what they want among the menu options presented to them.

| # of groups | Subject role | Research | Research | Research | Simplified | General | General | History | Exhibits | Professional | Professional |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | Librarian 4DC | | Reference questions: How to find specific information (9) | | How to search or use online products (16) | | General information about: reports, services, collection arrangement (17) | | Informational: online exhibits (3) | | |
| 4 | Librarian 8DC | | NLM databases (18) | MedlinePLUS (3) | | | NLM info (20) | | Online exhibits (3) | | |
| 4 | Librarian 7DC | | NLM databases (14) | Info for professionals (11) | | Hot topics (7) | Visitors guide (9) | | | | |
| 7 | Librarian 6DC | Research: access to holdings (14) | Research: in depth, what we're doing type areas (9) | Basic info: researcher public (7) | Research: how to's (4) | Basic info: curious public (3) | Basic info: gen'l public (8) | | | | |
| 4.75 | <-- average groups per librarian | | | | | | | | | | |
| 9 | Medical 6IA | Specific diseases (4) | Clinical trials (2) | Research (2) | Subgroup of home (13) | "Home" page (9) | General public (6) | History of medicine (5) | Physical facility (4) | | |
| 10 | Researcher 3DC | Databases(8) | Clinical trials (2) | Research (2) | Training tool kit (5) | Health info for general public (5) | About the library (13) | History of medicine (5) | Library services (3) | Info for the media /press release (1) | Genbank (1) |
| 4 | Medical 1DC | | Professional research (8) | | Consumer medical info (7) | NLM information (30) | | | | | |
| 9 | Medical 3IA | | Clinical trials (2) | Research for clinicians (6) | How to search NLM databases (11) | Medical info for general public (4) | General info on NLM (12) | Historical medical references (3) | Online exhibits (3) | Grants (1) | Molecular biology/ toxicology (3) |
| 6 | Researcher 5IA | | Medical research (16) | | Bibliographic services (6) | Medical info for public (1) | NLM-what it is, who we are (13) | History of medicine (6) | | | Genetics, chemicals, toxicology (3) |
| 8 | General 2DC | Services/ databases (4) | Clinical trials (4) | Indexes (2) | Tools (5) | New developments (7) | Administration (18) | History (6) | | | |
| 5 | General 4IA | Search engines available (11) | Specific articles, documents available w/ NLM (11) | | | Services available with NLM (4) | General info on NLM (18) | | | | |
| 10 | General 1IA | Searches (11) | Tools-physician (6) | Tools-librarian & physician (1) | Tools-librarian (1) | Resources available (14) | Where to begin (6) | FAQ (2) | FAQ for educators (2) | Non-fiction (2) | |
| 6 | General 2IA | | Search for (8) | | | Home page general info (18) | NLM services and library collections (11) | History of medicine (4) | Online exhibits (4) | | |
| 7 | General 5DC | Medical cataloging (4) | Scientific, technical info (10) | | Consumer, public info (9) | What is NLM (8) | NLM staff, policies, etc. (10) | Historical perspective (4) | | | |

7.4 <--average groups per non-librarian (This larger average indicates greater conceptual differentiation of functions than demonstrated by librarians.)

Here is a mathematically constructed 'average' of the 4 to 9 groups utilized by non-librarians and labeled above. The cluster analysis identified 15 sub-groups, identical to the number of sub-groups found amongst the four librarians.



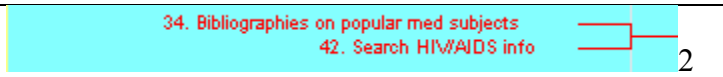
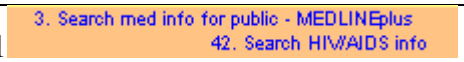
## 4.4 Comparisons of Sub-Group Clusters

Recall that we set the cluster analyses to produce15 sub-groups from each set of participants: librarians and non-librarians. This table pairs as many of the 15 sub-groups as possible, thus showing the degree of conceptual overlap between librarians and non-librarians.

We sequenced the groups in the librarian column the same as when they were produced by the IBM program EZ Calc.

We attempted to match non-librarian groups with librarian groups. A pair value of "No" indicates the lack of more than one corresponding function within the two sub-groups. A value of "Partial" indicates more than one function can be found in the two sub-groups. The numbers next to each sub-group indicate their respective high-level groups. We include these numbers to show the disjointedness of adjacent groups in the non-librarian grouping below.

| Pair? | | Non-Librarian Grouping |
|---|---|---|
| No | 10. Staff directory 1 | |
| Partial | 35. MeSH heading files for download by info profs<br>2. Browse special vocabulary - MeSH<br>31. About Bibliographic Svcs Div 1 | 5 35. MeSH heading files for download by info profs<br>2. Browse special vocabulary - MeSH<br>9. Browse special vocabulary - MeSH (DUP of 2) |
| No | 8. Services and collections for Nat Net of Lib of Med<br>41. Policies & practices for cataloging & organizing 1 | |
| No | 23. Contracts & puchasing - Acquisition Mgmt<br>37. Grants by NLM for med imaging, biomed computing<br>11. Reports and plans about the library<br>40. How to lease and license data from NLM 1 | 4 37. Grants by NLM for med imaging, biomed computing |
| No | 15. Press releases, etc.<br>16. Schedule tour of NLM for class 1 | 6 15. Press releases, etc. |
| Partial | 14. Common questions about NLM - FAQ<br>18. NLM depts: ref, cust serv, maintain collection, web<br>27. Ref & cust service at NLM: hours, contacts, searching<br>30. About NLM<br>45. How everday user gets info from NLM<br>12. Access to bldgs for physically challenged<br>20. Lib hours, directions, maps<br>44. Who can borrow from NLM, how to 1 | 6 23. Contracts & puchasing - Acquisition Mgmt<br>41. Policies & practices for cataloging & organizing<br>10. Staff directory<br>11. Reports and plans about the library<br>16. Schedule tour of NLM for class<br>45. How everday user gets info from NLM<br>14. Common questions about NLM - FAQ<br>44. Who can borrow from NLM, how to<br>30. About NLM<br>12. Access to bldgs for physically challenged<br>20. Lib hours, directions, maps<br>18. NLM depts: ref, cust serv, maintain collection, web<br>31. About Bibliographic Svcs Div |
| No | | 6 27. Ref & cust service at NLM: hours, contacts, searching |
| No | 13. Clinical Alerts and Advisories<br>38. Telemedicine for diagnosis & care 2 | 2 5. Search clin trials - Clinical Trials database<br>13. Clinical Alerts and Advisories |
| No | | 4 38. Telemedicine for diagnosis & care |
| No | 5. Search clin trials - Clinical Trials database<br>29. Visible Human Project 2 | |
| No | 21. Online exhibit on asthma<br>25. Online exhibit on Islamic med & Middle Ages<br>26. Online exhibit on Cesarean section 2 | 1 34. Bibliographies on popular med subjects<br>21. Online exhibit on asthma<br>29. Visible Human Project |

| | | |
|---|---|---|
| No |  |  |
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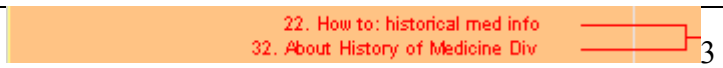
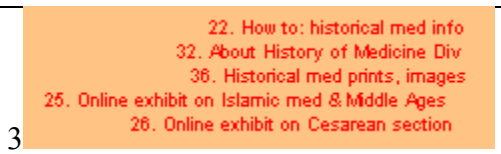
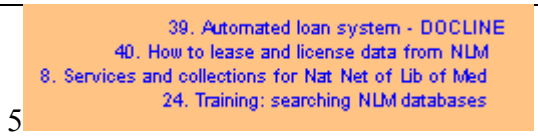
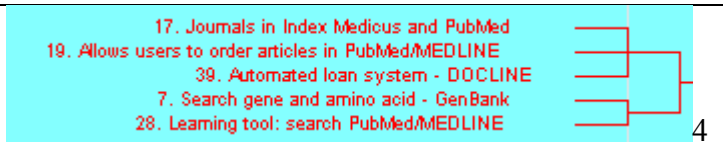
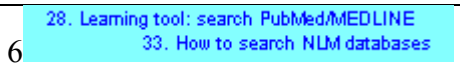
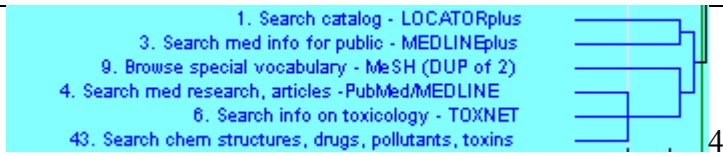
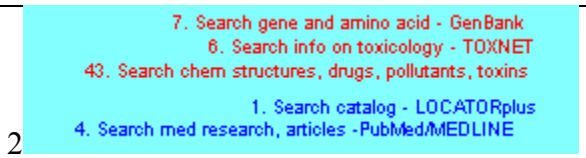
| Partial |  |  |
| No |  |  |
| Partial |  |  |
| No | |  |
| Partial |  |  |

We find 18 “pairs” (including 6 non-pairs resulting from non-overlapping sub-groups). Of these 18 pairs, five have more than one item shared between the pairs. We call these “Partial Pairs”. They constitute only 28% of the total pairs. Conversely, 72% of the sub-groups can be considered non-overlapping.

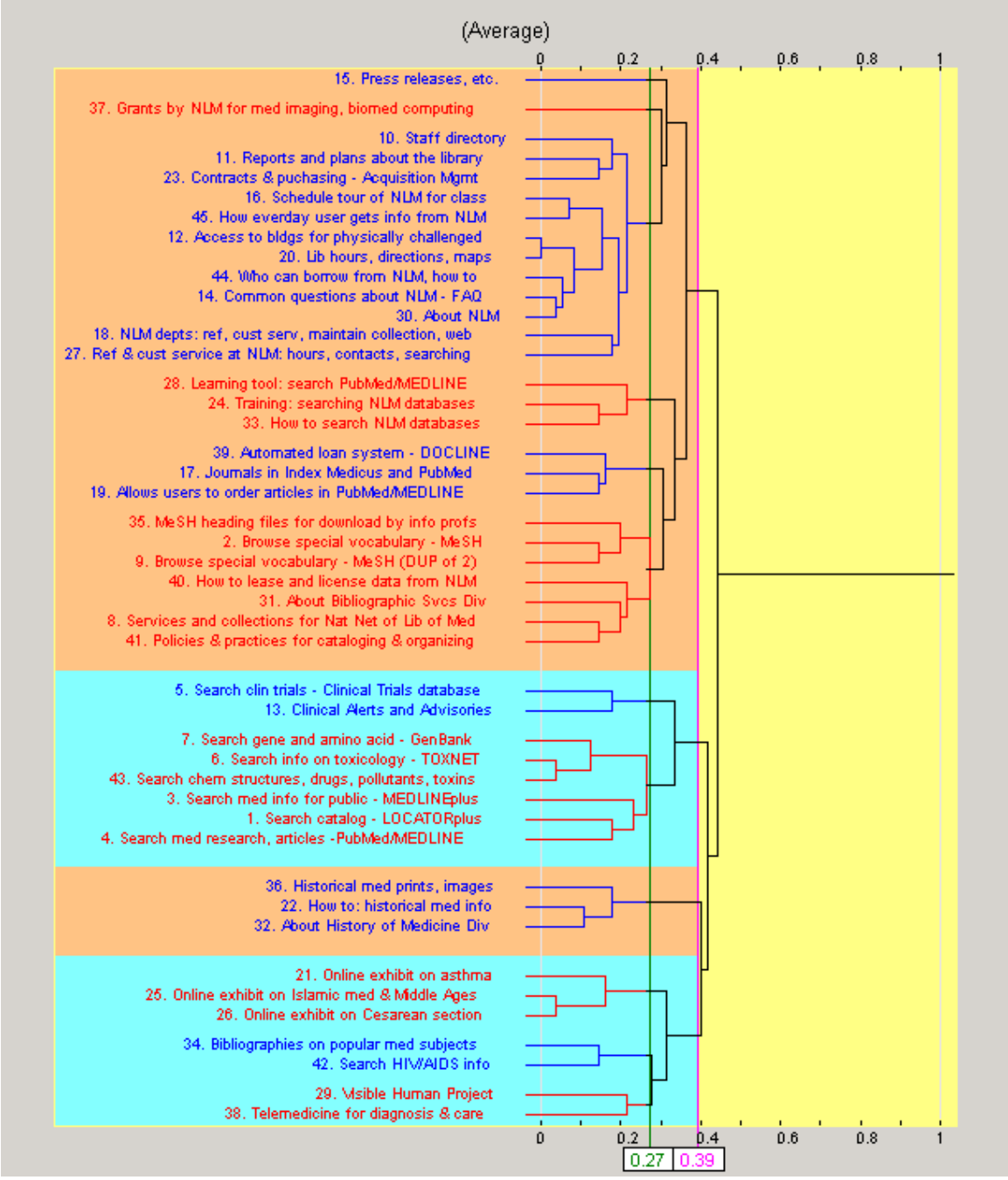
We interpret the lack of overlap of more than one item between the two respective sub-groups to illustrate the absence of a strong match between the librarian mental model and the non-librarian mental model. Even among those six partial pairs, typically the sub-groups share only two elements.

Thus, we conclude that in general, librarians do *not* think using the same group and sub-group categories as non-librarians. These two audiences do not share the same ‘mental model’. We must consider that using only librarians as a source of design input would bring a bias into the information architecture.

Thus, when designing the NLM information architecture, it will be important to account for the non-librarian perception of functions in addition to librarian perceptions, as illustrated in the next cluster analysis. It combines both sets of perceptions.

## 4.5 Grouping Performed by Librarians and Non-Librarians

This cluster analysis incorporates the mental models of both librarians and non-librarians. This set was colored to highlight 4 high level groups and 12 sub-groups. It remains for the NLM design team to ascertain the value of this set of sub-groups. We recommend refining the function names and inventing group and sub-group headers meaningful to the general public. This effort should be followed by reverse card sort testing to verify how well target audiences can utilize the group and sub-group names to locate the functions.



## 4.6 Recommendations for Site Category Reorganization

### *4.6.1 General Consensus Groups*

Based on our evaluation, the following groups of information seemed to make sense to both librarians and non-librarians

- Search tools (non MESH related) – Genbank, TOXNET, chemical structures databases – which librarians often saw as being a subset of all search tools (including LOCATORplus, MEDLINE, MEDLINEplus, TOXNET, chemical structures)
- Clinical information – Alerts & Advisories, Clinical Trials database
- Historical medical information
- Online exhibits
- Anything to do with MESH
- About NLM
    - General information, services, access, who can borrow, hours, directions
    - Contracts & purchasing, reports & plans, information on the different departments, staff directory
- Press releases
- Grants
- Learning how to search – how to search NLM databases, training on how to search NLM databases, how to search PubMED/MEDLINE

### *4.6.2 The Need for Cross-Linking*

There were several examples where it was clear that test participants expected the same item to be accessible via two different channels. But there is no reason why the item couldn't "live" in one group and also be accessible through other groups via cross-linking. For example:

- Learning tools sometimes were broken out differently:
    - Many test participants grouped a learning tool with its topical subject (e.g. learning about MEDLINE goes with MEDLINE)
    - Other test participants grouped all learning tools together
- Information about departments, e.g. Bibliographic Services associated with Indexing and Cataloging information or History of Medicine division associated with Historical Medical Information. The department pages should ideally live within the "About NLM" category, but should definitely be linked to their respective content areas.

### *4.6.3 Specific Recommendations for Site Reorganization*

As a compromise between the user data and the need for a coherent site organization, we recommend the following categories and subcategories (categories shown in **bold**). We have also populated the categories with items from the card sort for the purposes of illustration. Please keep in mind that the labels we have used are meant simply as suggestions. Also, keep in mind that substantial cross-linking will need to be employed regardless of how the site is reorganized.

**Health Information**

**Scientific & Medical Research**

- Scientific /medical information search aids
- Clinical alerts & trials
- Historical medical information

**Online Projects & Exhibits**

- Online exhibits
- Visible Human Project
- Telemedicine

**Library Information & Services**

- Library Catalog
- General Library Services
- Interlibrary Services
- Accessibility
- Cataloging
- How to search NLM databases
- How to license and lease data from NLM

**The NLM Organization**

**Common questions about NLM**

**Grants & Research**

Expanded view of recommended site categories:

**Health Information**

Consumer health and medical information (MEDLINEplus)

**Scientific & Medical Research**

- **Science / medical information search aids**
  - Technical scientific & medical articles (PUBMED/MEDLINE)
    - Order this article
    - List of journals in PUBMED and Index Medicus
  - Bibliographies on popular medical subjects
  - HIV/AIDS information
  - Gene sequences (Genbank)
  - Toxicology database (TOXNET)
  - Chemical structures, drugs, pollutants, toxins
  - Standardized medical vocabulary for indexing - MeSH
    - Search MeSH
    - Browse MeSH
    - Download MeSH heading files
- **Clinical alerts & trials**
  - Clinical Alerts & Advisories
  - Clinical Trials database
- **Historical medical information**
  - Historical medical prints and images
  - How to: historical medical information

**Online Projects & Exhibits**

- **Online exhibits**
- **Visible Human Project**
- **Telemedicine**

**Library Information & Services**

- **Library catalog (LOCATORplus)**
- **General Library Services**
  - Library directions, hours, maps
  - Who can borrow from NLM, how to
  - How everyday user gets information about NLM
  - Reference and customer service
  - Schedule a tour of NLM for class
- **Interlibrary Services**

Automated loan system – DOCLINE

NNLM

- **Accessibility:** Access to buildings for physically challenged
- **Catalog policies & practices**
- **How to search NLM databases**

  How to search NLM Databases

  Training: searching NLM databases

  Learning tool: search PubMED/MEDLINE
- **How to license and lease data from NLM**

**The NLM Organization**

- About NLM
- Staff Directory
- NLM departments
- Reports & plans about the library
- Contracts & purchasing – acquisition management
- Press Releases

**Common questions about NLM**

**Grants & Research**

# 5. Findings and Recommendations from the Usability Test

## 5.1 General Observations

The mental model of librarians was most in evidence when they interacted with the NLM home page, as well as elsewhere on the site. As indicated during the card sort exercise, this more technical approach differs from the mental model of non-librarians. These differences (and other issues) raised numerous usability issues during the usability test sessions. To highlight the various issues associated with the home page, we have circled examples of the 'technical' terms found on the NLM home page.

Starting with Section 5.2, we summarize these usability issues and present potential solutions that can be applied throughout the current NLM site. However, these potential solutions should be in no way considered a substitute for the reorganization of NLM site categories.

### *5.1.1 Tasks Performance— by Groups and Combined*

Cursory review suggests that librarians did not perform better or worse than non-librarians. Thus, we can reasonably aggregate the data of all three groups without fear of introducing bias to the results. Note, however, that librarians were given only 7 out of the 10 tasks used by the non-librarians. Librarians failed about 18% of their tasks, and either failed or found difficult about 43% of their tasks. Non-librarians failed 12% -18% of the tasks, and failed /found difficult 34% - 44% of their tasks. Overall, participants failed about 14% of the tasks and either failed or found difficult 39% of the tasks. The bolded cells below indicate tasks that gave the greater difficulty.

**Tasks scored 'Fail' or 'Difficult'**

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 Tasks | | All-Diabetes | All-PubMed MEDLINE | All- borrow NLM | Gen'l-VisibleHuman | Gen'l-Asthma Exhibit | All-Infectious Textbooks | All-WhatIsNLM | Lib- Missoula Lib | Lib- Res-MeSH diabetes | Res-GrantsInfo |
| Failed: | Gen Subjs | 1 | 0 | 0 | 0 | 2 | 1 | 0 | | | 0 |
| Difficult: | Gen Subjs | 0 | 1 | 2 | 1 | 1 | 2 | 1 | | | 0 |
| | Total Gen | 4 | 5 | 5 | 5 | 4 | 4 | 5 | | | 1 |
| 12.5% | % General failed | 25.0% | 0.0% | 0.0% | 0.0% | 50.0% | 25.0% | 0.0% | | | 0.0% |
| 34.4% | % Gen failed & diff | 25.0% | 20.0% | 40.0% | 20.0% | 75.0% | 75.0% | 20.0% | | | 0.0% |
| | | | | | | | | | | | |
| Failed: | Lib Subjs | 1 | 0 | 1 | | | 2 | 1 | 0 | 0 | |
| Difficult: | Lib Subjs | 1 | 0 | 2 | | | 2 | 1 | 0 | 1 | |
| | Total Lib | 4 | 4 | 4 | | | 4 | 4 | 4 | 4 | |
| 17.9% | % Library failed | 25.0% | 0.0% | 25.0% | | | 50.0% | 25.0% | 0.0% | 0.0% | |
| 42.9% | % Library failed & diff | 50.0% | 0.0% | 75.0% | | | 100.0% | 50.0% | 0.0% | 25.0% | |
| | | | | | | | | | | | |
| Failed: | MedResSubjs | 1 | 0 | 0 | 0 | 1 | 1 | 1 | | 0 | 0 |
| Difficult: | MedResSubjs | 0 | 1 | 1 | 0 | 0 | 1 | 4 | | 1 | 1 |
| | Total MedRes | 5 | 5 | 5 | 1 | 1 | 5 | 5 | | 2 | 2 |
| 17.8% | % MedResfailed | 20.0% | 0.0% | 0.0% | 0.0% | 100.0% | 20.0% | 20.0% | | 0.0% | 0.0% |
| 44.4% | % MedResfailed&diff | 20.0% | 20.0% | 20.0% | 0.0% | 100.0% | 40.0% | 100.0% | | 50.0% | 50.0% |
| | | | | | | | | | | | |
| Failed: | All Subjs | 3 | 0 | 1 | 0 | 3 | 4 | 2 | 0 | 0 | 0 |
| Difficult: | All Subjs | 1 | 2 | 5 | 1 | 1 | 5 | 6 | 0 | 2 | 1 |
| | Total All | 13 | 14 | 14 | 6 | 5 | 13 | 14 | 4 | 6 | 3 |
| 13.5% | % All failed | 23.1% | 0.0% | 7.1% | 0.0% | 60.0% | 30.8% | 14.3% | 0.0% | 0.0% | 0.0% |
| 37.8% | % All failed & diff | 30.8% | 14.3% | 42.9% | 16.7% | 80.0% | 69.2% | 57.1% | 0.0% | 33.3% | 33.3% |

### *5.1.2 Time – by Groups and Combined*

Again, librarians seemed to not have any particular advantage in completing tasks. In fact, the average time was about 3.2 minutes for librarians versus 2.5 and 2.7 minutes for medical professionals /researchers and general participants, respectively. Given the small number of participants, these times should be considered statistically equivalent. However, note that Librarians averaged only .7 minutes in completing the task requiring use of PubMed or MEDLINE, versus 1.5 and 1.9 minutes for the other two groups. This can be considered evidence that librarians may find it easier than non-librarians to benefit from the technical meaning of PubMed and MEDLINE.

**Time** **(minutes rounded to nearest 15-30 seconds)**

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| All tasks | | All-Diabetes | All-PubMed MEDLINE | All- borrow NLM | Gen'l-VisibleHuman | Gen'l-Asthma Exhibit | All-Infectious Textbooks | All-WhatIsNLM | Lib- Missoula Lib | Lib- Res-MeSH diabetes | Res-GrantsInfo |
| 2.7 | Gen Avg | 4.8 | 1.9 | 2.7 | 1.7 | 3.9 | 4.1 | 1.8 | | | 0.8 |
| | Gen SD | 2.8 | 0.9 | 0.7 | 0.7 | 1.4 | 0.9 | 1.3 | | | |
| | Gen Subjs | 4.0 | 5.0 | 5.0 | 5.0 | 4.0 | 4.0 | 5.0 | | | 1.0 |
| | | 0.0 | | | | | | | | | |
| 3.2 | Lib Avg | 4.6 | 0.7 | 3.3 | | | 4.8 | 2.3 | 2.3 | 4.3 | |
| | Lib SD | 5.0 | 0.4 | 1.7 | | | 1.5 | 0.6 | 1.0 | 2.6 | |
| | Lib Subjs | 4.0 | 4.0 | 4.0 | | | 4.0 | 3.0 | 4.0 | 4.0 | |
| | | 0.0 | | | | | | | | | |
| 2.5 | MedRes Avg | 3.9 | 1.5 | 2.5 | 0.3 | 5.0 | 4.3 | 2.3 | | 2.1 | 1.0 |
| | MedRes SD | 3.0 | 1.0 | 1.3 | | | 1.5 | 0.7 | | 0.2 | |
| | MedResSubjs | 5.0 | 5.0 | 4.0 | 1.0 | 1.0 | 4.0 | 5.0 | | 2.0 | 1.0 |
| | | 0.0 | | | | | | | | | |
| 2.7 | ALL Avg | 4.4 | 1.4 | 2.8 | 1.5 | 4.1 | 4.4 | 2.1 | 2.3 | 3.5 | 0.9 |
| | All SD | 3.4 | 0.9 | 1.2 | 0.8 | 1.3 | 1.2 | 0.9 | 1.0 | 2.3 | 0.2 |
| | All Subjs | 13.0 | 14.0 | 13.0 | 6.0 | 5.0 | 12.0 | 13.0 | 4.0 | 6.0 | 2.0 |

### *5.1.3 Clicks for Passed Tasks -- By Groups and Combined*

Here, we look at the average number of clicks required to complete all tasks. Librarians used an average of 5.0 clicks, while non-librarians used 4.7 and 4.2 clicks (respectively Medical/Researchers and General participants). We make no comment on the optimal number of clicks. While 'three clicks' is often used as a criteria for good design, research indicates that a better criteria is the degree to which the user can maintain interest and motivation. Thus, more clicks than three could be suitable for some tasks.

**Pass Clicks (Clicks from particpants who passed the task)**

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| All tasks | | All-Diabetes | All-PubMed MEDLINE | All- borrow NLM | Gen'l-VisibleHuman | Gen'l-Asthma Exhibit | All-Infectious Textbooks | All-WhatIsNLM | Lib- Missoula Lib | Lib- Res-MeSH diabetes | Res-GrantsInfo |
| 4.2 | Gen Avg | 4.7 | 3.4 | 5.4 | 3.4 | 3.5 | 6.7 | 3.6 | | | 3.0 |
| | Gen SD | 2.1 | 2.1 | 1.7 | 1.7 | 0.7 | 3.5 | 0.5 | | | |
| | Gen Subjs | 3.0 | 5.0 | 5.0 | 5.0 | 2.0 | 3.0 | 5.0 | | | 1.0 |
| | | | | | | | | | | | |
| 5.0 | Lib Avg | 4.7 | 2.3 | 6.7 | | | 7.0 | 4.0 | 4.8 | 5.5 | |
| | Lib SD | 1.2 | 1.3 | 2.5 | | | 1.4 | 1.0 | 1.3 | 3.1 | |
| | Lib Subjs | 3.0 | 4.0 | 3.0 | | | 2.0 | 3.0 | 4.0 | 4.0 | |
| | | | | | | | | | | | |
| 4.7 | MedRes Avg | 5.0 | 2.8 | 5.0 | 3.0 | | 6.0 | 5.0 | | 7.5 | 3.5 |
| | MedRes SD | 0.8 | 1.3 | 2.3 | | | 2.4 | 1.4 | | 3.5 | 0.7 |
| | MedResSubjs | 4.0 | 5.0 | 5.0 | 1.0 | | 4.0 | 4.0 | | 2.0 | 2.0 |
| | | | | | | | | | | | |
| 4.5 | ALL Avg | 4.8 | 2.9 | 5.5 | 3.3 | 3.5 | 6.4 | 4.2 | 4.8 | 6.2 | 3.3 |
| | All SD | 1.2 | 1.6 | 2.1 | 1.5 | 0.7 | 2.4 | 1.1 | 1.3 | 3.1 | 0.6 |
| | All Subjs | 10.0 | 14.0 | 13.0 | 6.0 | 2.0 | 9.0 | 12.0 | 4.0 | 6.0 | 3.0 |

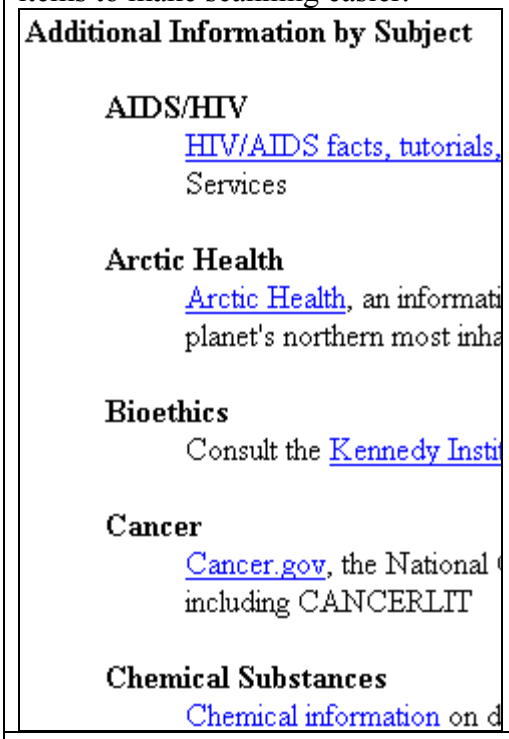
### *5.1.4 Ease of Completion – by Groups and Combined*

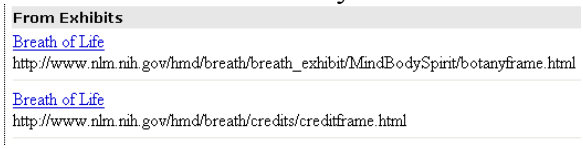
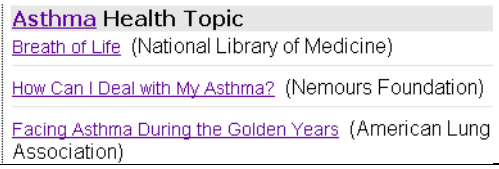
Consider 'Ease of Completion' as a rough, global index of success. A score of '1' indicates success on a task, with only 1 or 2 extra clicks. A score of '.5' indicates the task was completed, but with difficulty (extra clicks, pondering, waiting, etc.). A score of '0' indicates the participant failed to complete the task. Interestingly, librarians scored .7, essentially the same as non-librarians. General participants scored .8 (where 1 = success without difficulty) and Medical/Researchers scored .7. While this scoring method appears to meet the criteria of 80% rating (equivalent to a "B" on a typical test), we suggest that the participants in this case were probably more sophisticated than many users of the NLM site. Thus, we recommend using the overall findings from Section 4.1.1 in which Difficult and Fail scores were combined. In that analysis, overall, participants either failed or found difficult 39% of the tasks. The following sections help define the reasons for the challenges indicated by this latter score.

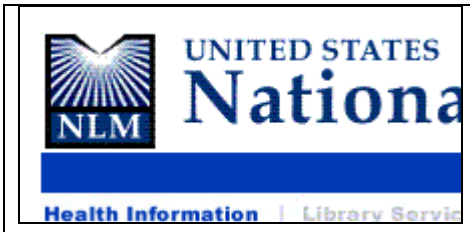
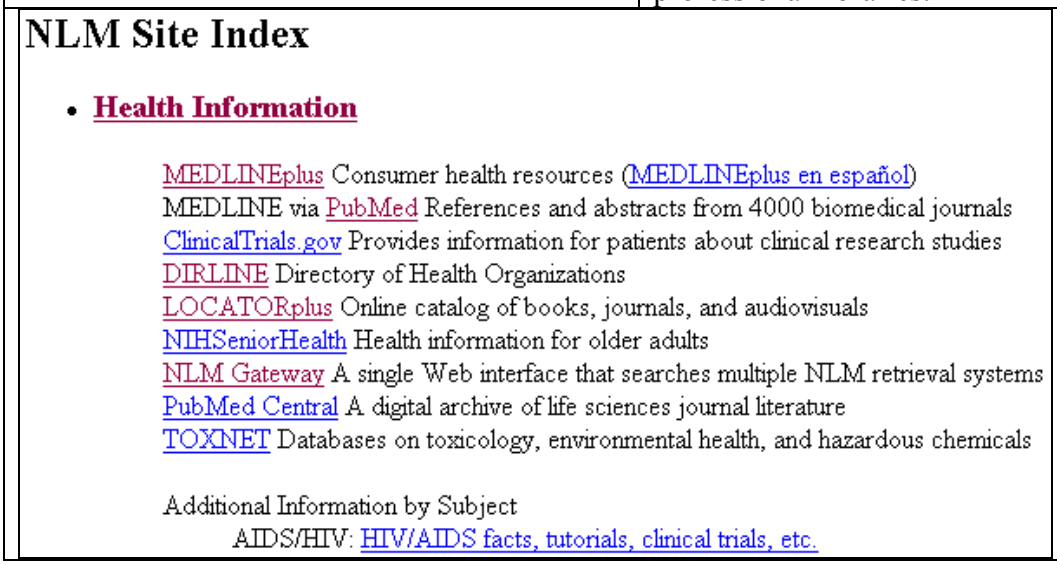
**Ease of Completion (1=OK; .5=Difficult; 0=Fail)**

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| All tasks | | All-Diabetes | All-PubMed MEDLINE | All- borrow NLM | Gen'l-VisibleHuman | Gen'l-Asthma Exhibit | All-Infectious Textbooks | All-WhatIsNLM | Lib- Missoula Lib | Lib- Res-MeSH diabetes | Res-GrantsInfo |
| 0.8 | Gen Avg | 0.8 | 0.9 | 0.8 | 0.9 | 0.4 | 0.5 | 0.9 | | | 1.0 |
| | Gen SD | 0.5 | 0.2 | 0.3 | 0.2 | 0.5 | 0.4 | 0.2 | | | |
| | Gen Subjs | 4.0 | 5.0 | 5.0 | 5.0 | 4.0 | 4.0 | 5.0 | | | 1.0 |
| | | | | | | | | | | | |
| 0.7 | Lib Avg | 0.6 | 1.0 | 0.5 | | | 0.3 | 0.6 | 1.0 | 0.9 | |
| | Lib SD | 0.5 | 0.0 | 0.4 | | | 0.3 | 0.5 | 0.0 | 0.3 | |
| | Lib Subjs | 4.0 | 4.0 | 4.0 | | | 4.0 | 4.0 | 4.0 | 4.0 | |
| | | | | | | | | | | | |
| 0.7 | MedRes Avg | 0.8 | 0.9 | 0.9 | 1.0 | 0.0 | 0.7 | 0.4 | | 0.8 | 0.8 |
| | MedRes SD | 0.4 | 0.2 | 0.2 | | | 0.4 | 0.2 | | 0.4 | 0.4 |
| | MedResSubjs | 5.0 | 5.0 | 5.0 | 1.0 | 1.0 | 5.0 | 5.0 | | 2.0 | 2.0 |
| | | | | | | | | | | | |
| 0.7 | ALL Avg | 0.7 | 0.9 | 0.8 | 0.9 | 0.3 | 0.5 | 0.6 | 1.0 | 0.8 | 0.8 |
| | All SD | 0.4 | 0.2 | 0.3 | 0.2 | 0.4 | 0.4 | 0.4 | 0.0 | 0.3 | 0.3 |
| | All Subjs | 13.0 | 14.0 | 14.0 | 6.0 | 5.0 | 13.0 | 14.0 | 4.0 | 6.0 | 3.0 |

## 5.2 Labeling

| Issue | Possible Solution |
|---|---|
| Ad hoc groups such as "Additional Information by Subject" lack specificity. **This forces the user to read each item in the group,** which negates the benefit of grouping items to make scanning easier.<br>  <br>**Additional Information by Subject**<br>**AIDS/HIV**<br>HIV/AIDS facts, tutorials,<br>Services<br>**Arctic Health**<br>Arctic Health, an informati<br>planet's northern most inha<br>**Bioethics**<br>Consult the Kennedy Insti<br>**Cancer**<br>Cancer.gov, the National<br>including CANCERLIT<br>**Chemical Substances**<br>Chemical information on d | Distribute the items from the ad hoc groups to other existing or new groups. Insure all group headers make sense to the target user populations.(e.g., Task 1) |
| **Names such as MEDLINEplus or PUBMED/MEDLINE fail to inform the user** about the actual function or value of these tools.<br>  <br>*Welcome to the world's largest medical library and creator of MEDLINE/PubMed.* | For navigation paths, utilize names that communicate a benefit to the user. At the bottom level of the navigation path, indicate the benefit-oriented name (e.g., medical research articles), while also indicating the specific name with it (e.g., MEDLINEplus) to encourage the more knowledgeable users. (e.g., Task 1) |
| **Do not use supporting text that is not related to its associated header on the home page.** For example, users overlooked PubMed/ MEDLINE because it was under an unexpected header: Health Information.<br>  <br>HEALTH INFORMATION<br>MEDLINE/PubMed, MEDLINEplus, NLM Gateway | Ideally, insure that supporting text matches the header through use of 'reverse card sort' testing. (For each function, participants would be asked to match it to a header.) Also, use generic terms for supporting text so that users will not ignore unfamiliar terminology. Indicate the specialized term as an add-on in the final selection option. (e.g., |

| | |
|---|---|
| | Task 2) |
| **Avoid computer-related jargon**, since it may not be understood by all the audiences using the NLM Web site. For example, we have found that many consumer audiences are unfamiliar with the term "FAQ."<br><br>  <br> | The best solution is to NOT need a list of "Frequently Asked Questions". The logic being that if these are "frequent questions", then the Web site navigation should be adjusted to forestall the need to ask the question—as a question. That is, the site visitor should find answers to their questions via the regular navigation. The next best solution is to spell out "Frequently Asked Questions" as a navigation label. (e.g. Task 3) |
| **Avoid forcing site visitors to infer meaning from ambiguous labels.** This reduces scanning speed and increases intellectual effort. In many cases, ambiguous labels prevent users from completing tasks. For example, "Breath of Life" is hard to interpret without any supporting evidence that it is an exhibit about asthma. The following comes from the About the Library search.<br>  <br> | Insure clear presentation of the benefit of a product or option. For example, consider rewriting the title to be "Recovering from Asthma—the Breath of Life". Invoke a 'usability mind-set' rather than a 'marketing mind-set'. Novel titles work only when supported by advertising that explains the title. Most NLM contexts do not have space or resources to explain titles. (e.g., Task 5)<br><br>We note, however, that in the MEDLINEplus search facility, the results list effectively uses categorization to solve these issues.<br>  <br> |
| **Users expect common site features and are confused when they cannot find them.** For example, the absence of a link for "About NLM" caused users to resort to "trial-and-error" clicking to locate information about the National Library of Medicine. Likewise, absence of a "Home" link in the top left corner of the screen frustrated other users. The NLM logo along was not a sufficient clue, unless the user placed the mouse pointer over the graphic. | Utilize population stereotypes as much as possible, such as 'About <x>' links. Although not fail-safe, this approach addresses the needs of a reasonably significant percentage of site visitors much better than if they were forced to reinvent a convention specific to the site. (e.g., task 7)<br><br>Note: Although the site displayed a Home link at the top right, it did not meet the needs of users who expected a Home function at the top left based on |

<table>
<tr><td> 
</td><td>prior experiences with other sites.<br><br> 
</td></tr>
<tr><td>Do not use undefined abbreviations. For example, MeSH provides meaning only to a very small subset of users.<br> 
</td><td>Use widely-accepted terminology that clearly presents a benefit to the site visitor. The benefit provided by MeSH might better be suggested by “Standard Medical Search Terms (MeSH)”. Note that even “Medical Subjects Headings” fails to communicate the real purpose of MeSH.</td></tr>
<tr><td>“Site Index” fails to communicate the contents of the page. This page more rightfully should be called a “Table of Contents” because it only repeats the contents of the top two levels of the NLM site.</td><td>Because the page only repeats the top two levels of navigation, it can rightfully be said that the Site Index offers nothing new to the site visitor. A better function would, indeed, be an index—especially because it could include technical terms to support professional libraries.</td></tr>
<tr><td colspan="2"> 
</td></tr>
</table>

## 5.3 Lists

| Issue | Possible Solution |
|---|---|
| As found in the Medical Encyclopedia, **long lists with repeated phrases intimidate, slow down reading, and encourage confusion** among users making a hypertext selection.<br>  <br> | Insure that list items appear sufficiently different that the reader appreciates the list rather than becoming irritated at repetitious phrases and words. For long lists, create sub-groups in the list, placing a blank space every 6 lines or so. (e.g., Task 1) |
| **Technical terms are mixed with generic terms. This is confusing to non-librarians** and does not serve librarians who seek specific technical aids. For example, the home page mixes undefined terminology such as PubMed/MEDLINE with more generic terms.<br>  <br> | Remove technical terms from lists, and/or associate the technical term with its generic equivalent on the same line. Consider serving the expert, professional user with their own page of technically-oriented options an Index or special Table of Contents. Providing a Search field is helpful, as well. (e.g., Task 2) |
| **Avoid search results that may frustrate or confuse site visitors.** For example, avoid color codes. 8% of males have some form of color blindness (.5% of females). Codes without legends are also often misinterpreted by users. Insure useful sort order (greatest relevance or most recent date first). Present the language most probably desired, in this case English. Avoid ambiguous titles such as *Life that Lives on Man* or augment them with concise descriptors. For example, most of our test participants conducted a search for books on "infectious diseases" using LOCATORplus, and found the following results to be unhelpful. | Each of the comments to the left implies its solution. Mainly, provide a default scheme that categorizes and sequences search results in ways most likely to serve the average site visitor. Other specialty search criteria should be easily manipulated by the user, including re-sorting by clicking on column |

| | |
|---|---|
| | headers. (e.g., Task 6) |

| # | Relevance | Title | Author | Dates |
|---|---|---|---|---|
| [ 1 ] | | Gnoinye zabolevaniia kisti / A. V. Grigorian, V. K. Gostishchev, B. A. Kostikov. | Grigorian, A. V. (Aramais Vagarshakovich) | 1978 |
| | | *Library Location: General Collection* *Call Number: WR 220 G857g 1978* *Status: Available* | | |
| [ 2 ] | | Life that lives on man. | Andrews, Michael. | 1977-1976 |
| | | *Library Location: General Collection* *Call Number: AA506* *Status: Available* | | |
| [ 3 ] | | Skin infections [videorecording] / Dept. of Pediatrics, Emory University, School of Medicine. | | 1979 |

| | |
|---|---|
| **Support users' expectations for familiar icons and their standard functionalities.** Sites that do not support these standards risk confusing and aggravating their users. When the NLM search results appear in the Site Search facility, the top left folder is NOT shown opened. However, the contents shown on the right side indeed belong to the top left folder. | Maintain consistency of operation when using familiar iconic metaphors such as folders in a directory structure. The left folder below should be open. |

Search results for **"breath of life"**

- National Library of Medicine (40)
- Health Information - MEDLINEplus (66)
- Profiles in Science (61)

**From National Library of Medicine**

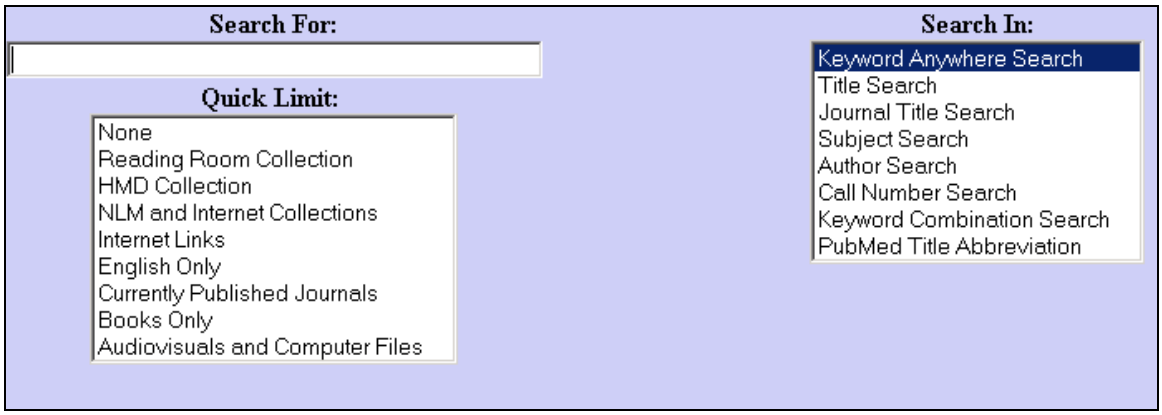
APDB - Exhibits - Breath of Life
http://lhncbc.nlm.nih.gov/apdb/exhibits/asthma/asthma.html

## 5.4 Search

| Issue | Possible Solution |
|---|---|
| **Make the Search functionality more relevant to users.** Typically, Search provides answers to questions that have a very specific formulation, such as 'use PubMed/MEDLINE'. However, most participants overlooked the search function.<br>  | If a site answers questions about specific topics, consider placing an actual search field in a salient position on the home page, and any other page where the user may realize that search is the best option. The search field is much better than a search link because it is seen as being immediately accessible (e.g., Task 2) |
| **NLM search results can be too sparse and cryptic.** For example, upon viewing results of a search on Visible Human Project, the site visitor sees only two entries: MEDLINEplus: Databases and MEDLINEplus: Anatomy. The visitor has no immediate criteria for picking one or the other, and remains confused. To get a usable list of options, the user must make additional click. | Present a list of options, categorized as much as possible. In the case of the example given, present the associated entries for each of the MEDLINEplus categories. We understand there may be technical limitations prohibiting this solution. However, the principle holds, and merits attempts at solving the problem. (e.g., Task 4)<br><br>Note: After usability testing was completed, we noticed that the display of search results had been modified. We show the **new** version below. While the grouping and headers certainly improve the usability of the Search Results interface, we still remain puzzled by output of specific search results. For example, there are various search results for "Visible Human Project" that are still not related to the original search criteria. |

(new design, subsequent to the usability test)

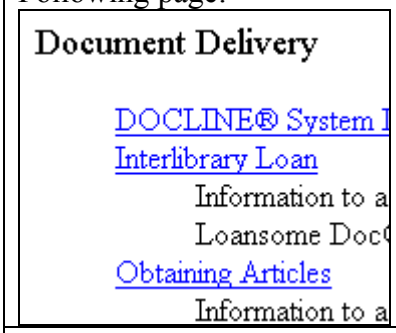

| | |
|---|---|
| **Do not provide complex search functions that fail to offer defaults.** For example, LOCATORplus fails to offer suitable and easy-to-use constraints to the book search. (See below) | Insure the search functions are clear to site visitors by using options that are more than mutually exclusive. Many users will want multiple simultaneous search constraints. It is important that the default settings suit the majority of users since many users will ignore customized settings for the search functions. |



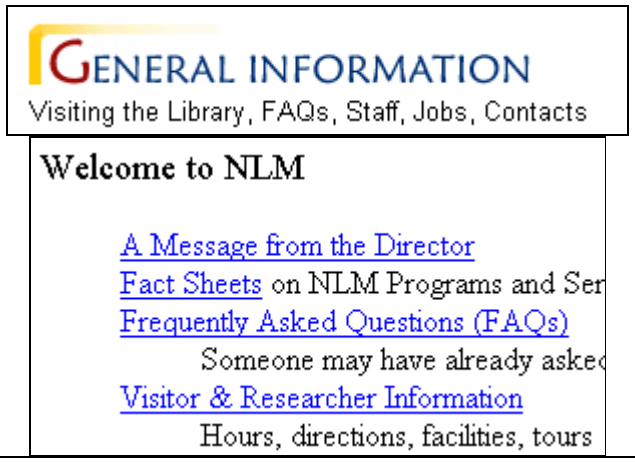
## 5.5 Utilization of Page Space

| Issue | Possible Solution |
|---|---|
| **Do not use unfamiliar or ambiguous terms over and over.** For example, the NLM home page shows the word "MEDLINE" in several contexts: MEDLINEplus and MEDLINE/PubMed. Plus, these terms are repeated in various positions. (See home page illustration above.) | Use terminology familiar to at least 80% of the users, thus gaining greater exposure of important NLM material on the home page and subsequent pages. If a term must be used on the home page, then explain its benefit to the reader. (e.g., Task 2) |

## 5.6 Menus

| Issue | Possible Solution |
|---|---|
| **Always provide complete listings of sub-group names to avoid misleading users.** For example, the supporting text under the home page option Library Services fails to mention "Document Delivery" although this subcategory DOES appear on the associated Library Services page.<br>  <br><br>Following page:<br>  <br> | Design grouping headers so that supporting text on the home page can encompass the entirety of the options reflected in the grouping headers. Alternatively, indicate a 'More…' link in the supporting text to encourage visitors to actively investigate other options. (e.g., Task 3) |
| **Hyperlink all descriptors or supporting text to provide direct access to all subcategories.** For example, the individual items described by the supporting text on the home page are not clickable. The user must take the extra step of clicking through another page. | Make the supporting text options clickable on an individual basis. Thus, the desired sub-group can be position at the top of the resulting page. (e.g. Task 3) |


**Always match the name of the subcategory with its associated link to avoid confusing users.** For example, the General Information header on the NLM home page has supporting text that includes "Visiting the Library". However, the top-level General Information page does not mention a Visiting the Library subcategory. The closest is 'Welcome to NLM'. Many site visitors will wonder if these two are the same.

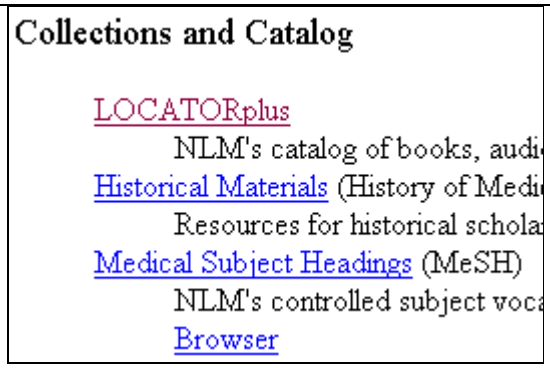



Insure consistency between clickable options and the header represented on the destination page. This gives assurance to the site visitor that they got to where they thought they were going. (e.g. Task 3)

**Always maintain parallel structures in menu hierarchies.** Otherwise, users will unconsciously be forced to constantly compare menus.

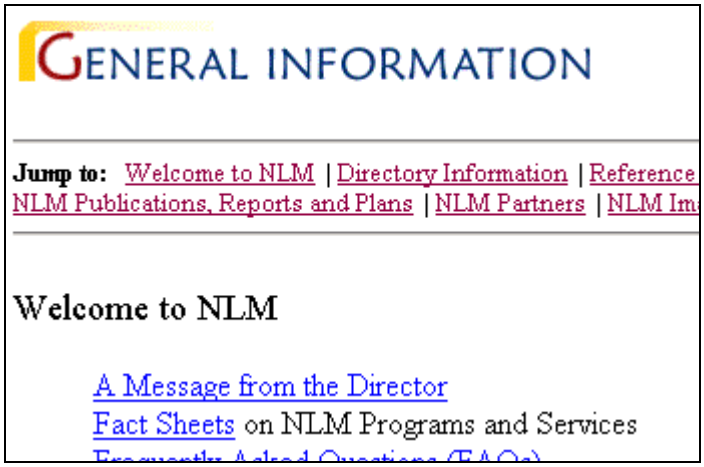
For example, when looking for MeSH services, the word MeSH is found on the home page (under Library Services) along with other "high level" concepts like Catalog, etc. However, on the following page, MeSH is not shown on same hierarchical level as Catalog. The word "MeSH" is not also used as the main part of the lower-level entry. This change of presentation can be misleading.


Always use familiar concepts to organize NLM functions and features. When a hierarchy is established on the home page, maintain that structure in subsequent pages to facilitate user recall and recognition.




## 5.7 Functional Immediacy

| Issue | Possible Solution |
|---|---|
| **Do not force users to drill down to frequently used topics or highly important topics.** For example, test participants expected to read text associated with '"General Information" when clicking that link. However, the associated page only had other links. Participants indicated their frustration at being blocked from immediate access to this information. | Consider adding text to pages that have an implied promise for answering a significant question. The answer should be concrete, useful, and not require additional clicks.<br><br>Here, the promise of "General Information" is implied to be something like "About NLM". Two or three sentences that orient the site visitor to the mission and goals of NLM would meet a very common need among visitors new to the site. (One might ask if these sentences should actually appear on the home page.) (e.g., Task 7) |



# Appendix A: Data from the Usability Tests

## A.1 NLM UT Test, Task One

### *A.1.1 Intent of Task*

The goal of Task One is to determine:

- Where users will look first for treatments (with diabetes as an example)
- Whether users will prefer Health Information, MEDLINE Plus, PUBMET/MEDLINE or some other NLM home page link
- Whether users would search
- General ease of completion

### *A.1.2 Scenario*

All participants started their task using the NLM home page

Participants were asked, "Find information on diabetes treatments for someone who has just been diagnosed with the disease."

### *A.1.3 Task Results*

| % Completed Task | % Failed or Difficult* | Failed task | Approximate avg. time* (SD)* | Average clicks* (SD) |
|---|---|---|---|---|
| 76.9% | 30.8% | 3 of 13 participants | 4.4 min (3.4) | 4.8 (1.2) |

* see section 3.2.3 Usability Test Metrics for an explanation of these statistics

*Participants = 13*

**Primary Path: Health Information**
10 of 13 participants (10/13) selected Health Information, indicating that this option serves well to orient users towards locating 'disorder' information as well as 'health' (or well-being) information. However, the three participants who failed to find details on diabetes treatment all started with this path. The one additional participant found this task to be difficult also began with the same path.

Only more participants fail in Task Six, which was a more difficult task that asked participants to locate textbooks dealing with infectious disease.

On the Health Information page, many participants looked for "diabetes" in the list of "Additional Information by Subject". They were puzzled because other frequent disorders indeed were listed, such as AIDS/HIV, Cancer, and Malaria, but not diabetes.

**Design inference: Ad hoc lists cause confusion and frustration when looking for a desired item**. The contents of 'Additional Information by Subject' are unclear, misleading, and present a mixture of

sub-categories that are each incomplete. Use lists and list headings that offer the site visitor clear value beyond 'additional information'.

6 out of the 10 participants who viewed the Health Information page selected MEDLINEplus. The four other participants selected PUBMED/MEDLINE. Note that the descriptive text for these two options is **not** mutually exclusive. The first offers to "Find answers to your health questions", the second offers "References and abstracts from 45 biomedical journals." Both can offer treatment to diabetes or any other disorder.

**Design inference: Make the differentiating value of each path clear and hopefully mutually exclusive,** both here and in other instances of choices between various database selections. It is also important to identify the option by the benefit it offers the site visitor rather than by the name of the database (which is typically a name designed for attention-getting novelty rather than clear communication).

Of the three participants who did not view the Health Information page, one participant started with the Site Index, then selected MEDLINEplus. The second participant selected MEDLINEplus from the NLM home page. The third participant selected Search Our Web Site from the home page. Therefore, all three of these participants ultimately conducted searches.

The participants who used links to links to view the Medical Encyclopedia or other lists found these lists intimidating to read and had difficulties selecting the most appropriate reference among the many links that mentioned diabetes.

**Design inference: Whether lists result from searches or from pre-made lists, users become intimidated when given similar choices for the same topic.** The solution is to…

- Present lists with obvious differences between the options that allow rapid scanning.
- Group the list items. Be sure to place a break every 5 or 6 rows to allow the eye to move easily through 'sub-groups' of items.
- Keep the list phrases short to enhance clarity.
- Reduce reading burden by removing repeated words and phrases.
- Upon selecting an item, go to a subsequent page, and then let the user review the more subtle differences within the selected topic.
- Make those subtleties clear through careful selection of terminology and layout.

The three participants who failed this task came from each of the three user groups we studied: general users, librarians, and medical professionals/researchers. The specific comments from these participants are listed below:

- General user: Did not see the word 'treatment' in the various lists. Thus, went back to health topics, and ended up making miscellaneous clicks looking for 'treatment' (even though many items in the lists showed the word 'diabetes'.)
- Librarian: "I saw too many entries in the list of 'diabetes' hits for rapid understanding. Decided to look into clinical trials, then into book search."

- Medical Professional / Researcher: "The list of search hits 'did not make sense'. Looked for something that would make sense to the layman. Would prefer using Google. Tried the search again, and still could not make sense of the results."

## A.4 NLM UT Test, Task Two

### *A.2.1 Intent of Task*

The goal of Task Two is to determine:

- Where users will look first for latest medical information
- Whether users will prefer Health Information, PUBMED/MEDLINE
- Whether users would search
- General ease of completion

### *A.2.2 Scenario*

All participants started their task using the NLM home page

Participants were then asked, "Where on this site could you search the database of the latest medical research, PubMed/MEDLINE?"

### *A.2.3 Task Results*

| % Completed Task | % Failed or Difficult | Failed task | Approximate avg. time (SD) | Average clicks (SD) |
|---|---|---|---|---|
| 100% | 14.3% | 0 of 14 participants | 1.4 min (.9) | 2.9 (1.6) |

*Participants = 14*

5 of 14 participants selected Health Information. (Note that this option mentions 'MEDLINE' in two descriptors: MEDLINE/PubMed and MEDLINEplus.) Two more participants selected the MEDLINE/PubMed option in the upper right corner, and one more participant selected the MEDLINEplus graphic on the mid-right side. Therefore, it was clear that test participants did take the time to carefully scan the options. Since MEDLINEplus is **not** the same as MEDLINE/PubMed, users were forced to make a judgment call although there is no clear differentiation between these two different home page options. In the case of this task, MEDLINEplus was selected by one participant although the task specifically referred to PubMed/MEDLINE.

**Design inference: Avoid confronting site visitors with similar or repeated options that demand prior specialized knowledge.** Most visitors do not have that special knowledge. The space for the similar or repeated options can be better used to provide access to other frequently used options. Also, utilize option names that offer a clear benefit to the user rather than a new concept that requires training to appreciate.

Among the 6 remaining participants, 4 selected Research Programs and 2 selected Library Services. We find this very interesting, given that the phrase PubMed/MEDLINE was given in the task instruction and appeared in the supporting text under Health Information. All these participants ultimately ended up on a PubMed page after realizing they did not find what they wanted.

**Design inference: This task indicates that some site visitors will definitely skip over descriptors, such as the ones listed below Health Information (e.g. MEDLINE/PubMed) and instead rely on just the primary categories.** This means the primary categories must as self-explanatory and differentiated when read as a set. Descriptors must also be written in such a way that they are as closely related to the primary category as possible. We recommend that NLM does not rely solely on undefined specialty terms such as like "PUBMED/MEDLINE." Instead, use phrases such as "Search scientific & medical articles – MEDLINE" which are more self-explanatory.

Most non-librarians did not recognize specialized jargon such as PubMed/MEDLINE and turned to any category which they felt met their needs. In this task, this meant "Research Programs" or "Library Services," which turned out to be incorrect categories. When given a unique word, many participants did find that a search field on the home page can be useful. A persistent search field was specifically requested by some test participants. This persistent search may indeed meet the needs of many users who are searching for a specific disorder, book, phrase, or other library search term. During the NLM tests, many participants indicated that they did not consider the "Search Our Web Site link" to be relevant. Instead, consider placing a search field directly on the Home Page in a more visible area such as the left side or center of the home page.

## A.3 NLM UT Test, Task Three

### *A.3.1 Intent of Task*

The goal of Task Three is to determine:

- Where users will look first for borrowing a book.
- Whether Library Services and General Information draw users.
- Whether users would search
- General ease of completion

### *A.3.2 Scenario*

All participants started their task using the NLM home page

Participants were asked, "Can you borrow a book from the National Library of Medicine?"

### *A.3.3 Task Results*

| % Completed Task | % Failed or Difficult | Failed task | Approximate avg. time (SD) | Average clicks (SD) |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 92.9% | 42.9% | 1 of 14 participants | 2.8 min (1.2) | 5.5 (2.1) |

*Participants = 14*

7 of 14 participants selected Library Services. 6 of 14 selected General Information. While borrowing a book is reasonably a 'library service', it was surprising that there was no descriptive term for "book borrowing" listed below Library Service. We see Catalog, Databases, etc, but no reinforcement of traditional library services. We can guess that the 6 participants who selected 'General Information' did so out of lack of such reinforcement under Library Services and because General Information offered the next best thing: 'Visiting the Library' and 'FAQs'. Note, by the way, that most non-expert computer users do not know what FAQ means.

**Design inference: Make careful and effective use of descriptor text that is displayed below a header link.** The text gives meaning to the header and vice-versa. However, there are certain limitations. For example, in each of the follow-up pages for the home page headers, we found that follow-up pages actually have additional categories that were not mentioned in the supporting text. (Library Services includes Training and Outreach, of which "Outreach" is not mentioned on the home page.) The current method of displaying supporting text appears to be 'exhaustive', so some site visitors will most likely infer that other topics are NOT covered by that option, and are not motivated to explore a section in its entirely. This means that they may miss the option of training and outreach altogether. In the current task, visitors moved on to the next best option, which was General Information.

Another example of missing supporting text is 'Document Delivery'. It is a group header on the Library Services page, but does not appear as supporting text on the home page. Document Delivery represents three subordinate links, one of which is 'Interlibrary Loan'—one of the answers to this task question. If the supporting text uses *most* of the other headers found on the Library Services page, why doesn't the supporting text represent *all* the headers? If there are too many headers, then consider regrouping the items to allow complete representation on the home page supporting text.

In summary, when constructing supporting text, either display 'more…' or better yet, use supporting text that gives exhaustive representation to all the sub-options. In both cases, consider making the supporting text hyper-links, thus allowing the site visitor to act on the item they identify as their goal. The resulting display would position the associated group directly at the top of the subsequent page, reducing the need to look and scroll for the desired concept.

Last, we should comment on issues associated with using the concept of FAQ. In general, if users **must** go to an FAQ page, we should consider the design as less than optimal, particularly for functions that represent main responsibilities of a site such as borrowing a book. FAQ pages are a 'catch-all' that should ideally be avoided. Generally, they exist to represent the help desk prior to an actual call to the help desk. Help desk issues arise out of design deficiencies. Thus, the solution is to learn from the FAQs, then re-design the information architecture to solve the problems addressed in the FAQs.

However, since many site visitors do expect to see Frequently Asked Questions, we do recommend that users have access to this list of questions and answers. Users, however, should not have to rely on the FAQ.

## A.4 NLM UT Test, Task Four

### *A.4.1 Intent of Task*

The goal of Task Four is to determine:

- Will users know where to look for this information?
- Whether users would search
- General ease of completion

### *A.4.2 Scenario*

All participants started their task using the NLM home page. This task was for general users only (one medical professional was included, however.)

Participants were asked, "Where would you find the Visible Human Project?"

### *A.4.3 Task Results*

| % Completed Task | % Failed or Difficult | Failed task | Approximate avg. time (SD) | Average clicks |
|---|---|---|---|---|
| 100% | 16.7% | 0 of 6 participants | 1.5 min (0.8) | 3.3 (1.5) |

*Participants = 6*

This task tested the tendency of participants to read the supporting text displayed on the home page. Under Research Programs, the third supporting item is 'Visible Human Project'. 5 of 6 participants selected Research Programs, and then exercised the patience to locate the Visible Human Project link under the category 'Digital Computing and Communications'. The high degree of success on this task indicates that these users do read the text on the home page, and indeed do carefully scan even extensive text such as found on the Research Programs page. However, we comment below on how to make the scanning easier.

The one participant who experienced difficulty on this task conducted a search for Visible Human Project, because he said he didn't know what the Visible Human Project was. (Actually, many of the other participants indicated they didn't know what it was, either.) After the participant entered the terms into the Health Information field, the search results only indicated "MEDLINEplus: Databases" and "MEDLINEplus: Anatomy" but the participant persevered, selected 'Anatomy,' and found the Visible Human Project. We suspect that most site visitors would terminate at this point, not suspecting that additional items are revealed under those links.

**Design inferences: Although some motivated users will read (as indicated by this task), not all users will read everything. Therefore, it is important the site design does not rely on users to read all text.**

Methods to reduce reading include clear grouping, use of clear headers, concise descriptions, and use of drill down navigation. (Regarding clear headers, we wonder if 'Digital Computing and Communications' is as clear and as motivating as alternative descriptions such as 'Digital Imaging and Medical Futures'.) Research indicates that hierarchical menus serve users well for drill-down tasks. These menus should optimally contain no more than 6 groups with headers, no more than a maximum of about 24 items , and no more than 10 items within a group, and. These rules can be stretched, as needed, with the caveat that user speed and comprehension will be negatively affected.

Next, we wonder why the valuable real estate on the NLM home page devotes space to supporting text that narrowly focuses on one particular offering out of the literally thousands of offerings in NLM. Yes, the Visible Human Project is well known (among the cognoscenti), but should this rightfully take real estate from some other category of potentially tens or hundreds of offerings, which otherwise will go unknown among site visitors? This is a difficult question, with no easy answer, except to suggest that perhaps another category on the home page might be "Online Projects and Exhibits" or even "Famous NLM Projects."

Why would a user select Visible Human Project if they didn't know what it is? This name does not clearly communicate its content. This issue reminds us of a prior recommendation to use generic, meaningful terms to describe offerings. Thus, site visitors may be better served by reading something like "Detailed computer images of the human body"—thus garnering a far greater number of page visits than obtained by the more cryptic 'Visible Human Project'. This approach definitely applies to metatag descriptors used for the search function, as well.

Last, we should consider having the NLM search function import the MEDLINEplus list for the first category displayed in the NLM list. As noted above, the NLM search results list only showed MEDLINEplus: Databases and MEDLINEplus: Anatomy. This type of abstract description requires the user to guess what the category specifically contains. To reduce guessing, we recommend providing both items as 'jump links at the top' plus a default display of the follow-on lists associated with each of these items. Then the user can see clearly that the jump list results do have supporting results. They can scan the supporting results or select the alternative top level result, etc.

## A.5 NLM UT Test, Task Five

### *A.5.1 Intent of Task*

The goal of Task Five is to determine:

- Where users will look first for online exhibits.
- Whether the term 'asthma' must be associated with an exhibit name
- Whether users would search
- General ease of completion

### A.5.2 Scenario

All participants started their task using the NLM home page

Participants were asked, "You've heard that NLM produced an online exhibit on asthma. Where would you find that?"

### A.5.3 Task Results

| % Completed Task | % Failed or Difficult | Failed task | Approximate avg. time (SD) | Average clicks |
|---|---|---|---|---|
| 80% | 80% | 1 of 5 participants | 4.1 min (1.3) | 5.5 (3.1) |

*Participants = 5*

Only 'General' participants were asked to complete this task. However, one Medical Professional was included to replace the incomplete data from one of the general participants (server problems prohibited completion of the task.)

3 out of the 5 participants failed to complete the task, with one additional participant finding it difficult (an 80% rate of Failed or Difficult). Thus, we must try to determine the source of the difficulties found here. Four of the participants selected New & Noteworthy on the home page, probably because the supporting text indicated 'Exhibits' (as mentioned by at least one participant). The fifth participant conducted a site search typing 'asthma' into the Health Information field, found nothing, and gave up. The two participants who found Exhibits commented that 'Breath of Life' was an interesting play on words, but offered no help in associating it with asthma. They strongly recommended including the word 'asthma' in the exhibit title.

**Design inferences: In this task, it is clear that the inherent challenge of the 'marketing mind-set' conflicts with the 'usability mind-set'.** The two successful participants were lucky. They inferred the meaning of 'Breath of Life' probably only because they were given the word 'asthma' in the task instruction. Most site visitors who did not have this advance information would probably need to guess on the exact content of a 'Breath of Life' exhibit.

Marketing practices typically seek novelty, with the assumption that supporting materials will explain the context of a novel title, description, or graphic. However, in the case of the Web, these supporting materials are typically not present in search results or in links, which leaves the site visitor in the dark regarding the actual meaning of the item (or exhibit).

Solution: include the benefit in the name of any and all offerings. "Breath of Life" should be renamed something like "Recovering from Asthma—the Breath of Life". In this same vein, all search results links should include clear, concise descriptive text from the description metatag. Users should not be forced to click to learn the meaning of a hyperlink option.

# A.6 NLM UT Test, Task Six

## *A.6.1 Intent of Task*

The goal of Task Six is to determine:

- Whether users will successfully find the NLM booklist
- General ease of completion

## *A.6.2 Scenario*

All participants started their task using the NLM home page

Participants were asked, "How would you find recent textbooks on infectious diseases that are owned by NLM"

## *A.6.3 Task Results*

| % Completed Task | % Failed or Difficult | Failed task | Approximate avg. time (SD) | Average clicks |
|---|---|---|---|---|
| 69.2% | 69.2% | 4 of 13 participants | 4.4 min (1.2) | 6.4 (2.4) |

*Participants = 13*

This was a challenging task. 4participants failed and 5 found it difficult, leading to a 69.2% rate of participants who failed or found the task difficult. The larger number of participants doing the task indicates this is much less a statistical anomaly than occurred on Task 5, which had only five participants.

Almost all the participants ended up using LOCATORplus, reaching it either via Library Services (12), or General Information (1). Difficulties occurred in making sense of the many results displayed upon searching for 'infectious diseases'. Participants had difficulty finding a result they could interpret either as a 'textbook' or as 'recent'. Only a few participants utilized the Quick Limit or Search In features. Two participants used the Advanced Search capabilities, with not much extra benefit.

**Design inferences: Test participants had difficulty with Boolean operations (as in the Advanced Search).** Also, it was clear that participants did not necessarily read about the available options and understand how to use them. Specifically, the Quick Limit and Search In features were not clearly understood or users by most participants.

Misleading cues also had a negative impact on user performance. For example, the Quick Limit list presumably uses 'None' as the default. However, it is not highlighted when it first appears. Thus, several participants had no cue that the Quick Limit list could be important, or that 'None' is activated. Beyond that, it appears that most participants would have preferred more than one option, such as both English Only, as well as any number of other options. We suggest the Quick Limit options would better be

presented as checkboxes, thus allowing more than one selection at the same time. A set of reasonable checkboxes would be defaulted on such as Book, English, Recent dates first, etc. The same argument goes for the Search In list.

The position of the Quick Limit list may also contribute to the participants' sense that the Quick Limit is not directly applicable. It is centered and is not left aligned below the Search For field. Likewise, Search In also appears quite detached from the Search For field. Grouping the three items with a uniformly colored background may improve their association, in addition to re-positioning the three items relative to each other.

This is not a trivial design issue and merits redesign and retesting, particularly of the resulting list. We saw that participants were particularly vexed in interpreting the findings and manipulating them to reduce the over-abundance of search hits. (One user commented she could not interpret the red and green 'codes' displayed in the relevance column.)

Typically, the search fields should be redisplayed about the list of search results to easily allow users to verify their search parameters and revise their search as necessary.

As one participant indicated, 10 years 'dates' a book (as being out of date), and 20 years suggests it is an historical document in the fast developing world of medicine. Site visitors may question the use of a default relevance rating that offers a 1978 book? This type of search result is simply *not* relevant for most users and increases user distrust of the search engine.

Last, each book should have a description beyond just the title. For example, the second item on the list is 'Life that lives on man'. This is unclear, misleading, uninformative, and unduly consumes time for the harried searcher (plus it is out-dated at 1977-1976). (Upon reflection, the title appears to be a pun—presumable about infectious bacteria or viruses, not lice.) Presumably there exist online descriptions or reviews of books that can be recruited for this function.

## A.7 NLM UT Test, Task Seven

### *A.7.1 Intent of Task*

The goal of Task Seven is to determine:

- Whether users will successfully recognize that they need to look under
- General ease of completion

### *A.7.2 Scenario*

All participants started their task using the NLM home page

Participants were asked, "What is the National Library of Medicine?"

### *A.7.3 Task Results*

| % Completed Task | % Failed or Difficult | Failed task | Approximate avg. time (SD) | Average clicks |
|---|---|---|---|---|
| 85.7% | 57.1% | 2 of 14 participants | 2.1 min (0.9) | 4.2 (1.1) |

*Participants = 14*

Sometimes an innocuous question can reveal important issues in a site design. Here, 2 out of 14 participants failed to complete the task, and another 6 participants found the task difficult. Almost all participants identified this task as referring to an 'About NLM' function. Thus, 13 selected General Information, which they felt implied an 'about' function, a function that has entered our collective 'population stereotype' as the place to find definitions about the site sponsor.

However, no 'About NLM' function appears readily on the General Information page. Thus, participants tried various options, some unsuccessfully, causing frustration, but finally hitting upon either Frequently Asked Questions or the Fact Sheets. Note that 'About' is a common term, but did not appear in the group under 'Welcome to NLM'.

**Design inference: Build on user expectations as much as possible to reduce trial-and-error and reduce the need for user inferences.** Terminology can be selected through user interviews and verified through usability testing.

Consider putting a brief explanation or set of bullet points that address the most frequent reasons for visiting a page. This relieves many users from the task of selecting another link for that function. Thus, the 'General Information' could include an 'about' explanation at the top to address this most-probable issue. It can be followed by categories of links, as currently displayed.

## A.8 NLM UT Test, Task Eight

### *A.8.1 Intent of Task*

The goal of Task Eight is to determine:

- Whether users will successfully recognize the special instance of library search
- How users will react to the organization of the information on library map
- Whether users will search
- General ease of completion

### *A.8.2 Scenario*

All participants started their task using the NLM home page

Participants were asked, "Let's say your hospital library is located in Missoula, Montana. How would you find another library that will serve one of your patrons."

### *A.8.3 Task Results*

| % Completed Task | % Failed or Difficult | Failed task | Approximate avg. time (SD) | Average clicks |
|---|---|---|---|---|
| 100% | 0% | 0 of 4 participants | 2.3 min (1.0) | 4.8 (1.3) |

*Participants = 4*

Only professional librarians were given this task. All completed it without difficulty. Three participants utilized the Library Services option on the home page; one participant utilized the General Information option. All participants ultimately used the National Network of Libraries of Medicine option which appears on both pages.

**Design inference: This model of navigation worked well for participants.** Participants found it helpful that the site specifically listed their item of interest (NN/LM) as a descriptor below a primary category on the home page. After they selected that category, they selected the same descriptor on the second-level page or evaluated the options within the category on the second-level page. Here, it turns out that the NN/LM is a category of its own. In general, it is best to avoid single-item categories because it often forces users to needlessly drill down an additional level.

# A.9 NLM UT Test, Task Nine

## *A.9.1 Intent of Task*

The goal of Task Nine is to determine:

- Whether users can handle technically oriented options
- Where users will expect to find this information
- General ease of completion

## *A.9.2 Scenario*

All participants started their task using the NLM home page

Participants were asked, "Where would you find the correct MeSH terminology for juvenile diabetes?"

## *A.9.3 Task Results*

| % Completed Task | % Failed or Difficult | Failed task | Approximate avg. time (SD) | Average clicks |
|---|---|---|---|---|
| 100% | 33.3% | 0 of 6 participants | 3.5 min (2.3) | 6.2 (3.1) |

*Participants = 6*

All 6 participants completed the task, with only two experiencing difficulties. This task was given to Librarians and Researchers only.

All participants selected the Library Services option, most likely as a result of their careful reading of the supporting text that included 'MeSH'. All typed 'juvenile diabetes into the MeSH search field. However, one included the word 'terminology' in the search—resulting in no hits, and some consternation about what was going on.

**Design inferences: This task revealed that ignoring certain design principles can increase the burden on the user and reduce user comprehension.** For example, the supporting text under Library Services promises 'MeSH'. The conscientious reader will also notice that the initial terms in the supporting text indicate 'Catalog' and 'Databases'. Thus, when participants look at the jump link on the Library Services page, and sees 'Collections and Catalog' and 'Databases' in the same sequence as the supporting text, they might expect to see 'MeSH' as part of that transfer of terms from the supportive text to the jump links. However, MeSH is nowhere to be found.

The conscientious reader who is sensitive to hierarchical structures may think that since Catalog (and Collections) was on the same level as MeSH in the supportive text, it is probably on the same level in the follow-on page. However, reading all the headers on the Library Services page fails to reveal the word 'MeSH.' This will be frustrating to some users.

This illustrates problems associated with inconsistent wording. Readers are often focused on a given word or phrase based on what the text has given them as a clue to their desired goal. When the document changes that word or phrase in unexpected ways, it can pose severe problems for the user.

We suggest a less technical alternative to MeSH to help uninitiated or novice users readers understand the function it provides. A description along the lines of "Standardized medical vocabulary for indexing - MeSH" would make this concept clearer for users (especially users who don't need to access MeSH but might click here out of desperation or curiosity). However, it is important to preserve the use of the term "MeSH" so that librarians and researchers who are familiar with the term do not need to learn a new name for it.

## A.10 NLM UT Test, Task Ten

### *A.10.1 Intent of Task*

The goal of Task Ten is to determine:

- Whether users will successfully identify or recognize the site sponsor
- Where users will expect to find this information
- General ease of completion

### *A.10.2 Scenario*

All participants started their task using the NLM home page

Participants were asked, "Where can you get information on grants"

### *A.10.3 Task Results*

| % Completed Task | % Failed or Difficult | Failed task | Approximate avg. time (SD) | Average clicks |
|---|---|---|---|---|
| 100% | 33.3% | 0 of 3 participants | 0.9 min (0.2) | 3.3 (0.6) |

*Participants = 3*

This task was for Researchers only. However, given only two researchers, we included one General participant to seek additional responses for analysis.

All three participants completed the task, with one experiencing 'difficulty'.

Two participants selected Library Services, one selected Site Index. This response indicated that indeed, participants *will* read the supporting text under the home page options ('Grants' appears beneath the Library Services option). However, we also learn that always, someone will fail to read what others consider 'the obvious'.

**Design inferences: Comments we made in previous tasks regarding the problems of inconsistent wording also apply to the experiences in this task.** The descriptor text on the home page says 'Grants'. However, on the Library Services page, the participant must be flexible enough to interpret 'Extramural' rapidly enough that they do not stop reading the phrase before also seeing 'Grants and Contracts' as part of the same phrase.

Based on past interviews with research-oriented individual for other NIH projects, the meaning of 'extramural' is lost, even among Ph.D.s. These individuals have often confessed to being puzzled by the word 'extramural'. Therefore, we recommend that the word "Extramural" be dropped from the description.

Last, we comment that the current NLM Site Index is not really an index (an alphabetical listing of elements of the site). It is instead a table of contents (a repetition of the navigational scheme supporting the home and second level pages.)We suggest that if the home and second level pages fail to assist the site visitor, this repetition will offer nothing new or supportive beyond what the visitor has already seen. We suggest instead that the NLM site provide either 1) an alphabetical index that includes both lay-person terms and technical terms, or 2) no index because the main navigation is sufficiently clear and effective. Option 2 is generally preferred for usability reasons.

# Appendix B: Usability Testing Protocol and Moderator's Guide

## B.1 Instructions for Moderators

**Test Session Guidelines:**

1) The participant should have sign the consent release sheet and filled out a background questionnaire before the participant begins the test session. Before administering your test session, review the background with the participant to **confirm that s/he is not an NIH employee or software developer**. These individuals are not eligible for testing.
2) Make certain than the test participant has filled out all areas of the background questionnaire.
3) Explain the purpose of usability testing:
4) Administer the activities in this order:
    a. **Background Questionnaire** (if the participant hasn't already filled it out)
    b. **Card Sort**
    **c. Task-Based Testing of NLM Site**
    **d. Unstructured questions:** Examples:
    "What do you like about this site?"
    "What works best for you on this site?"
    "What would you change?"
    "How might we improve the site?"
    "Can you point to examples of that?"

**Instructions to participant:**

"This is one of the ways that the National Library of Medicine gathers direct feedback from users about ways to improve their public Web site. We will you to complete some tasks and answer questions.

While you are completing tasks, please think aloud. We would like to know your opinions and thoughts. If you are not talking, I'll probably ask you what you're thinking.

We are **not** testing <u>you</u>. We are testing a version of the NLM Web site. Don't hesitate to tell me if something is really good or bad, or if something on the screen does not make sense. You won't hurt our feelings in any way. Your comments will help us make the site easier to use for users in the future.

Do you have any questions?"

**Note taking during task-based tests:**

- For each task, try to record the:
  - Time for completion (optional, number of clicks and level of hesitation is more important here)
  - Ease of completion
    OK = successful, no significant problems
    Difficult = successful but ran into dead ends along the way
    Failure = could not complete the task in the time allowed
  - # clicks
    Record using tick marks

## B.2 Background Questionnaire

Name: _____ Date: _____

1. ☐ Female ☐ Male
2. Age: _____
3. Are you an employee of the National Institutes of Health? ☐ Yes ☐ No
4. Are you employed, or have you ever been employed, as a software or Web site developer or a Web site designer?
   ☐ Yes ☐ No
5. What is your current occupation?

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6. Have you visited the Web at least once before? ☐ Yes ☐ No
7. If yes, how much time do you spend visiting Web sites every week, on average?
   - ☐ Less than 30 minutes
   - ☐ 30 minutes – 1 hour
   - ☐ 1- 3 hours
   - ☐ 3-10 hours
   - ☐ 10+ hours
8. Please indicate the highest level of education that you have completed:
   - ☐ Grade school
   - ☐ High school or GED
   - ☐ Associate degree
   - ☐ Bachelor's degree
   - ☐ Graduate degree (MS, Ph.D., and MBA)
   - ☐ Medical degree (MD, RN, certified nurse practitioner, etc)
   - ☐ Other

     _____

9. Have you ever used the NLM site before? ☐ Yes ☐ No

   If yes, what was the purpose of your last visit?

   What was your opinion of the site?

   How often have you visited the site?

   - ☐ Daily
   - ☐ Weekly
   - ☐ Monthly
   - ☐ Less than once a month
   - ☐ Less than once a year
   - ☐ Just once

10. What do you typically do with the health-related information that you might find on the Web? Please select **only** items that apply directly to you and **rank** your selections.

    RANK _____ ☐ Learn more about a particular medical issue or condition

    RANK _____ ☐ Learn about wellness issues

    RANK _____ ☐ Pass information along to family or friends

    RANK _____ ☐ Pass information along to patrons or patients

    RANK _____ ☐ Prepare for a meeting with a medical professional

    RANK _____ ☐ Share with students or teachers

    RANK _____ ☐ Use information to help a family member or friend make a medical decision

    RANK _____ ☐ Other uses _____

## Thank you for your cooperation!

## B.3 Card Sort Guide for Moderators

### Instructions for Cards: (Give card sort PRIOR to NLM site tasks)

Each card in this set has a description of different things you can do on the National Library of Medicine Web site.

1. Please group the cards based on what you think belongs together.

2. Then label each group of cards using blank cards and a marker.

3. Then tell me how you would prioritize the groups. Which groups would be most helpful or useful to you?

If you have any questions, feel free to ask at any time.

# Card Sort Items

- Search NLM's catalog of books, journals, and audiovisuals and other medical research tools (LOCATORplus)
- Browse NLM's special vocabulary used for indexing and cataloging of medical subjects. (MeSH)
- Search medical information for the public. (MEDLINEplus)
- Search medical research and articles published by doctors and researchers. (PubMed/MEDLINE)
- Search clinical trials research and studiestesting the effectiveness and safety of new drugs, therapies, vaccines, and treatments (Clinical Trials database)
- Search information on toxicology and hazardous chemicals (TOXNET)
- Search gene and amino acid sequences (GenBank)
- NLM services and collections offered to libraries who are members of the National Network of Libraries of Medicine
- Browse NLM's special vocabulary used for indexing and cataloging of medical subjects. (MeSH)
- NLM staff directory
- Job opportunities at NLM
- Official reports and plans about the library published by NLM.
- Access to buildings and facilities at NLM for the physically challenged.
- NIH Clinical Alerts and Advisories: Important news about the results of clinical trials research done to test the effectiveness and safety of new drugs, therapies, vaccines, and treatments that can be used by doctors to improve patient health
- NLM news and press releases
- Database on the Multiple Congenital Anomaly/Mental Retardation (MCA/MR) Syndromes,giving information about a syndrome, including synonyms, origins, naming of syndrome, and chromosomes affected.
- Common questions about NLM and its services (FAQ)
- Press releases and other information from NLM for an article a reporter is writing.
- How do I schedule a tour of NLM for my high school class.
- Journals included in Index Medicus and PubMed, the database of medical research published by doctors and researchers.
- Information on the NLM departments providing reference and customer service, maintain the library's collection of books, journals, and other materials, and run the Web site.
- A service (Loansome Doc) that allows users to order articles found in PubMed/MEDLINE (database of current medical research published by doctors and researchers).
- Library hours, directions, and maps
- Online exhibit about asthma
- List of all publications created by NLM staff.(NLM Publications Catalog)
- How to find historical medical information at NLM
- Information on contracts and purchasing processes at NLM (NLM's Office of Acquisition Management)
- Training services and manuals for searching NLM's databases
- Online exhibit of Islamic medicine and science during the Middle Ages
- Online exhibit on the historical use of the Cesarean section in childbirth.

- Reference and customer services at NLM: Includes library hours, how to contact the library, searching the library catalog, and customer service policies
- Web-based learning tool that shows users how to search PubMed/MEDLINE (the database of current medical research published by doctors and researchers).
- Visible Human Project: Online medical images displaying detailed, three-dimensional representations of male and female human bodies
- About the National Library of Medicine
- About the Bibliographic Services Division
- About the History of Medicine Division
- How to search NLM's databases
- Bibliographies of articles and books on popular medical subjects like Alzheimer's or Lyme's disease
- Medical Subject (MeSH) heading files that can be downloaded by librarians and other information professionals to use in cataloging and indexing medical information.
- Historical medical prints, photos, and images.
- Grants offered by the National Library of Medicine to fund research in areas such as medical informatics or biomedical computing.
- Telemedicine, the use of telecommunications technology for medical diagnosis and patient care.
- Automated loan request system allowing other libraries to borrow material from NLM (DOCLINE).
- How to lease and license data from the National Library of Medicine, like the data from PubMed/MEDLINE, a database of medical research published by doctors and researchers.
- NLM's policies and practices for cataloging and organizing medical information.
- Search HIV/AIDS information
- Search chemical structures, information on drugs, pesticides, pollutants and toxins.
- Who can borrow items from NLM and how to do it
- How the everyday user, such as a elementary school teacher, gets information from NLM.

## B.4 NLM Web Site UT Tasks

## Task Protocol: Text for Moderators

# **Moderator should clear all visited links before starting!**

"During this usability test, we will show you the Web site for the National Library of Medicine. We will you to complete some tasks, so you can show us how you would use the site.

While you are completing tasks, **please think aloud**. We would like to know your opinions and thoughts. If you are not talking, I'll probably ask you what you're thinking.

Please keep in mind that we're testing the Web site. We are **not** testing you. Don't hesitate to tell me if something is really good or bad, or if something on the screen does not make sense. You won't hurt our feelings in any way. Your comments will help us make the site easier to use for users in the future.

Do you have any questions?"

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Interesting notes/ comments during session:

## NLM UT – Start on NLM home page (www.nlm.nih.gov)

| Task | Summary / Clicks |
|---|---|
| **1.** Find information on diabetes treatments for someone who has just diagnosed with the disease.<br><br>- *Expectation: Librarians would search PubMed*<br>- *Expectation: General user would search MEDLINEplus* | **Time:**<br><br>**Ease of completion (circle one):**<br><br>OK difficult failed<br><br>**# clicks:** |

**Check the boxes and indicate user's order of actions. Fill in detail as necessary:**

- ❑ Health Information_____
- ❑ MEDLINEplus_____
  - ❑ Health Topics _____
  - ❑ Medical Encyclopedia _____
- ❑ PUBMED/MEDLINE_____
  - ❑ Direct search for_____
  - ❑ Other search_____
- ❑ Other NLM home page link_____
- ❑ Other _____
- ❑ Searched for: _____

**Participant comments:**

## NLM UT – Return to NLM home page

| Task | Summary / Clicks |
|---|---|
| **2.** Where on this site could you search the database of the latest medical research, PubMed/MEDLINE? | **Time:**<br><br>**Ease of completion (circle one):**<br><br>OK difficult failed<br><br>**# clicks:** |

**Check the boxes and indicate user's order of actions. Fill in detail as necessary:**

- ❑ Health Information_____
- ❑ PUBMED/MEDLINE_____
- ❑ _____
- ❑ _____
- ❑ Searched for: _____

**Participant comments:**

## NLM UT – Return to NLM home page

| Task | Summary / Clicks |
|---|---|
| **3.** Can you borrow a book from the National Library of Medicine? | **Time:**<br><br>**Ease of completion (circle one):**<br><br>OK difficult failed<br><br>**# clicks:** |

**Check the boxes and indicate user's order of actions. Fill in detail as necessary:**

- ❑ Library Services _____
  - ❑ Jump links at top of page? _____
  - ❑ Services_____
  - ❑ Reference & Customer Services_____
  - ❑ _____
- ❑ General Information _____
  - ❑ Jump links at top of page? _____
  - ❑ Fact Sheets_____
  - ❑ FAQs_____
  - ❑ FAQs → **Getting Articles & Borrowing Books**_____
    - ❑ How can I get…? (second bullet point) _____
- ❑ Other links _____
- ❑ Searched for: _____

**Participant comments:**

## NLM UT: Return to NLM home page

| Task | Summary / Clicks |
|---|---|
| **4. For general users only** (non-librarians, non-researchers, non-medical professionals) **:** Where would you find the Visible Human Project? | **Time:**<br><br>**Ease of completion (circle one):**<br><br>OK difficult failed<br><br>**# clicks:** |

**Check the boxes and indicate user's order of actions. Fill in detail as necessary:**

- ❑ Research Programs_____
  - ❑ Jump links at top of page? _____
  - ❑ Visible Human Project _____
    - ❑ Visible Human Project link to project _____
- ❑ New & Noteworthy_____
  - ❑ Exhibitions and Public Programs _____
- ❑ _____
- ❑ _____
- ❑ Searched for: _____

**Participant comments:**

## NLM UT – Return to NLM home page

| Task | Summary / Clicks |
|---|---|
| **5. For general users only** (non-librarians, non-researchers, non-medical professionals): You've heard that NLM produced an online exhibit on asthma. Where would you find that? | **Time:**<br><br>**Ease of completion (circle one):**<br><br>OK difficult failed<br><br>**# clicks:** |

**Check the boxes and indicate user's order of actions. Fill in detail as necessary:**

- ❑ New & Noteworthy_____
  - ❑ Jump link at top of page? _____
  - ❑ Exhibitions and Public Programs _____
  - ❑ Exhibitions and Public Programs link _____
  - ❑ _____
- ❑ Searched for_____
- ❑ _____
- ❑ _____

**Participant comments:**

## NLM UT – Return to NLM home page

| Task | Summary / Clicks |
|---|---|
| **6.** How would you find recent textbooks on infectious diseases that are owned by NLM? | **Time:**<br><br>**Ease of completion (circle one):**<br><br>OK difficult failed<br><br>**# clicks:** |

**Check the boxes and indicate user's order of actions. Fill in detail as necessary:**

- ❑ Library Services _____
  - ❑ Jump links at top of page? _____
  - ❑ LOCATORplus_____
    - ❑ Search LOCATORplus for:_____
    - ❑ _____
- ❑ General Information _____
  - ❑ Jump links at top of page? _____
  - ❑ Fact Sheets_____
  - ❑ FAQs_____
  - ❑ FAQs → **Getting Articles & Borrowing Books**_____
    - ❑ How can I find out if NLM owns…? (first bullet point)
      - ❑ LOCATORplus
- ❑ Searched for_____

**Participant comments:**

## NLM UT – Return to NLM home page

| Task | Summary / Clicks |
|---|---|
| **7.** What is the National Library of Medicine? | **Time:**<br>**Ease of completion (circle one):**<br>OK difficult failed<br>**# clicks:** |

**Check the boxes and indicate user's order of actions. Fill in detail as necessary:**

- ❑ General Information _____
  - ❑ Jump links at top of page? _____
  - ❑ Message from the Director _____
  - ❑ Fact Sheets_____
  - ❑ FAQs_____
    - ❑ General NLM information _____
      - ❑ What is NLM? _____
  - ❑ Visitor & researcher information_____
- ❑ Searched for_____
- ❑ _____

**Participant comments:**

## NLM UT – Return to NLM home page

| Task | Summary / Clicks |
|---|---|
| **8. For librarians only:** Let's say your hospital library is located in Missoula, Montana. How would you find another library that will serve one of your patrons? | **Time:**<br><br>**Ease of completion (circle one):**<br><br>OK difficult failed<br><br>**# clicks:** |

**Check the boxes and indicate user's order of actions. Fill in detail as necessary:**

- ❑ Library Services_____
  - ❑ National Network of Libraries of Medicine_____
    - ❑ Librarian and Health Educator Resources_____
      - ❑ Find NN/LM member libraries _____
- ❑ DOCLINE_____
  - ❑ _____
- ❑ Interlibrary loan_____
  - ❑ _____
- ❑ Searched for_____
- ❑ _____

**Participant comments:**

## NLM UT – Return to NLM home page

| Task | Summary / Clicks |
|---|---|
| **9. For librarians and researchers only:** Where would you find the correct MESH terminology for juvenile diabetes? | **Time:**<br><br>**Ease of completion (circle one):**<br><br>OK difficult failed<br><br>**# clicks:** |

**Check the boxes and indicate user's order of actions. Fill in detail as necessary:**

- ❑ Library Services_____
  - ❑ MeSH_____
  - ❑ MeSH browser_____
    - ❑ Searched MeSH for_____
- ❑ _____
- ❑ _____
- ❑ _____

**Participant comments:**

## NLM UT – Return to NLM home page

| Task | Summary / Clicks |
|---|---|
| **10. For researchers only:** Where can you get information on grants? | **Time:**<br><br>**Ease of completion (circle one):**<br><br>OK difficult failed<br><br>**# clicks:** |

**Check the boxes and indicate user's order of actions. Fill in detail as necessary:**

- ❑ Research Programs _____
  - ❑ Jump links at top of page? _____
  - ❑ Extramural Grants & Programs _____
  - ❑ _____
- ❑ General Information _____
  - ❑ Fact Sheets_____
    - ❑ NLM Sponsored Activities _____
  - ❑ FAQs_____
    - ❑ NLM's Extramural Programs _____
      - ❑ What is NLM? _____
- ❑ Searched for_____
- ❑ _____

**Participant comments:**