User-centered Web Design

Goals, problems, and procedures

1.0 User-centered Web Design
   1.1 Scope
2.0 Mission Statement, Goals, Standards
3.0 User Classes, Definitions & Model Development
4.0 Focus Groups
5.0 User Surveys-Design & General Model
6.0 User Surveys-Paper
   6.1 Potential Graduate Student Survey: Version 1.0
   6.2 Potential Graduate Student Survey: Preliminary Results
   6.3 Undergraduate Student Study: Carton-Donofrio
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Dale Austin
November, 2001

Department of Geological Sciences
University of Michigan
Scope

I know that half my advertising dollars are wasted-but which half?

Lord Leverhulme

The World-Wide-Web is a powerful marketing and information distribution system. Unfortunately it is too often carelessly directed. The difficulty arises in determining which parts of a web site are poorly aimed. At all levels of sophistication, web design is treated as a substitute for printed brochures or thirty-second television spots. With these design models, web sites simply fail.

The nature of HTML and browser technology means that it is not possible to lead your user around by the nose. Aside from the technological near impossibility, the culture of the web actively resents the attempt. It is therefore important to keep in mind that the most successful and useful web sites offer value to the user rather than the sponsor.

This flies in the face of normal advertising reasoning. In the traditional model the intention is to convince you to buy something, or to create brand loyalty. The web works best when a sponsor’s company or product is associated with a service or information for which the user has come looking. Remember, most browsers find a site with a search engine. They are looking for something and simply will not have the patience to sit through a canned sales pitch. The goal in web site design is to create a viable and useful service for the market segments you wish to consider you in a positive light. It is, in essence, advertising by positive association.

Achieving this positive association requires web design which concentrates on the needs of the user. Satisfying those needs requires; identify the audience, survey their needs, repeatedly test your design with those users, and at all times listen to the users. What follows is an outline of a program to define and achieve this user satisfaction.
www.geo.lsa.umich.edu

Exists to:

Serve the three part mission of the University: Teaching, Research, and Community Service

Meet the University's overall mission through the achievement of department-specific goals.

Meet the information needs of faculty, staff, students, and the public at large as regards the activities, processes, and standards of the department.
Should:

Provide information for journalists writing about the department and its personnel or events.

Direct potential and current students to information about the department, its courses, faculty, research, laboratories and procedures for admission to its programs.

Act as a gateway to web-based and web-centric resources for faculty and staff.
www.geo.lsa.umich.edu

Must:

Contain current and accurate information.

Provide a robust, error-free, easy to navigate interface.
**Procedure:**

Define market segments and intended audiences.

Examine market segment requirements.

Validate design and interface through heuristic usability examination.

Create clear-cut authority and responsibility for the maintenance of information.

Institute a regular review of in-house procedures.
Standards:

HTML-centric page encoding.

Avoid unnecessary multimedia effects.

Testing on current and legacy software and hardware.

Customer-driven design philosophy.

Sectional "least common denominator" design by market segment to accommodate informational needs and likely system requirements.
User Classes: Definitions & Model Development
Effective web design must reflect the needs of the users before it is able to serve the needs of the department. These needs can be divided into two groups—those which are reflected in self-reported behavior (preferences) and those which are reflected in actual usage (usability). The difficulty is in acquiring the information about either class of need for a market which has itself not been adequately defined.

Therefore, the first operational task is to define the various classes of users. Classes, because it is at least intuitively clear that a user’s needs will in some part reflect their demographics, and that these demographics can be lumped in some significant fashion. Further, classes will represent market segments to which we would present different materials. To that extent at least the market segments can be seen as an expression of the department’s goals.

Having defined target segments, we are faced with the task of characterizing the constraints which apply in each segment. This is not a matter for guesswork, but requires investigation. LS&A has hired a contractor for some of this work, and we will utilize the results of their research. However, the Caron Donofrio market study is at once limited in scope and not specific to the markets we would like to address. We must be prepared to conduct our own research into the behavior our target market. We can conduct some small-scale surveys, focus groups, and usability tests in-house.
User Classes

Potential Undergraduate Majors
Undergraduate Majors
Potential Graduate Students
Enrolled Graduate Students
Potential Faculty
Faculty
Academic Colleagues
Staff
Potential Staff
Journalists
Public
Alumni
Each class of user operates under a set of constraints. A web site must acknowledge and accommodate these constraints if it is to serve the users. Some of these constraints are in fact counter-intuitive unless care is taken in the definition of user classes. As an example: at first glance, the class journalist would presumably have high-speed internet access, fast, high resolution monitors, and state of the art software. To my own surprise, research has shown that this is true only of those full-time journalists working for established, fairly large operations. If the definition of journalist includes all those who write for regularly distributed print media, you discover that most journalists are self-employed stringers working from home over telephone lines and modems using older software. It is therefore necessary to define user classes with some care—leaving no assumptions. Some of the user constraints are:

### Hardware and software systems
Can this class of user even view your site?

### User proficiency
How experienced is the user with the web?

### Educational level
How likely is the user to be familiar with your subject?

### Topical concern
What topic is likely to be of greatest interest?

### Relevance requirements
How well have you matched the user's search parameters?

### Reliability requirements
How important is the accuracy of your information?
We are ideally placed to collect reliable focus-group data regarding the information needs of potential graduate students. A focus-group offers the opportunity to collect some in-depth perceptual data. I propose a one to one-and-a-half-hour session with the incoming class of graduate students during their first week in the department.

Though they will be current graduate students by that time, we have the opportunity to capture perceptions about the web as a recruiting tool in general, doing so before the incoming student's perceptions have been directed by the local information culture.

Information collection will utilize a simplified version of the user survey mailed to other potential students. Demographic and system profile data will be collected *en masse*, by a show of hands. Perceptual and preference information will involve discussion of between 6 and 12 questions designed to probe information requirements.
System Profile

Purpose: Determine hardware and software constraints.

Topics

- Bandwidth
- ISP/cost to user
- Window/Mac/Unix/Other
- Monitor size
- Monitor color depth
- Browser preference
- Browser version

Model Questions (indicate number by show of hands)

I connect to the web via:

- [ ] Ethernet
- [ ] Cable modem
- [ ] 56.6 modem
- [ ] 14.4 modem
- [ ] Other

My operating system is: (check all that apply)

- [ ] Windows
- [ ] Macintosh
- [ ] Unix/Linux
- [ ] Web TV
- [ ] Other

Monitor Size:

- [ ]
- [ ]
- [ ]

Number of available colors:

- [ ] 1-bit
- [ ] Greyscale
- [ ] 256
- [ ] Thousands
- [ ] Millions

I browse from:

- [ ] Work
- [ ] Home
- [ ] Library
- [ ] "Internet Cafe"
- [ ] Other

I browse with: (indicate version)

<table>
<thead>
<tr>
<th>Explorer</th>
<th>Navigator</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
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<td>[ ]</td>
</tr>
<tr>
<td>2 3 4 5 6</td>
<td>2 3 4 5 6</td>
<td></td>
</tr>
</tbody>
</table>

4.2
Search Engine Use

Purpose: Determine preferred search engine.

Model Question (indicate number by show of hands)

When researching a topic on the web, I use: (indicate frequency)

<table>
<thead>
<tr>
<th>Search Engine</th>
<th>Never</th>
<th>Sometimes</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lycos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AltaVista</td>
<td></td>
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<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Proficiency Self-Reporting

Purpose: Establish user's proficiency with software, hardware, information systems, and web browsers.

Topics

- Search engine use
- Download files (e.g. pdf, ps, etc.)
- Software installation
- Hardware maintenance

Model Question (indicate number by show of hands)

I would describe my skill at searching for information on the web as:

Very Low  |  Average  |  Very High
0       |   2      |   4

Downloading files (pdf, ps, etc.) is:

Difficult  |  Easy
0       |   2      |   4

I require help installing and maintaining hardware:

Always  |  Sometimes  |  Never
0       |   2      |   4

I require help installing software:

Always  |  Sometimes  |  Never
0       |   2      |   4
Behavior Self-Reporting

Purpose: Determine web use behavior patterns.

Topics

- Frequency of use
- Duration of use

Model Question (indicate number by show of hands)

I use the web:

- Daily
- Weekly
- Almost Never

When browsing the web, I stay on for:

- Just a few minutes
- 30-40 minutes
- Several hours
User Experiences

Purpose: Allow user to discuss their browsing experiences.

Model questions:

Think back to your experiences researching graduate programs.

What was the most important piece of information you would find at a department or college web site?

What information did you look for that you didn't find?
User Desires

Purpose: Allow user to discuss their information needs.

Model questions:

What information do you think should be available to potential/incoming graduate students through a department's web site?
User surveys about behavior are generally unreliable. It is pointless to ask someone how they accomplish a task. That question should be reserved for objective usability tests. Instead, surveys are valuable for matters of preference and perception and working environment. Different classes of users will have to be treated somewhat differently. Questions must be tailored to the presumed specifics of each group. In broad terms, we ask what users expect, what they want, what they felt they got, and how they responded to the experience.

User surveys dealing in preference and working environment are a good first step in web design-assuming you have defined the user class sharply enough. Surveys dealing in experiential perception are valuable after a working prototype has been established, and should accompany usability testing.
Purpose-All User Classes

Collect personal demographic information.
Collect system demographics.
Collect self-reported proficiency information.
Collect self-reported browsing behavior.
Determine keywords used in search engines.
Rank keywords as to relevance.
Ask subjects what content they would expect to find at a website intended to recruit student?
Approach: Potential Graduate Students

1) A written survey of the approximately 125 people who have been mailed information about the graduate program in Geological Science. These represent those who expressed interest but did not follow up, those who were accepted, but declined, and those who applied but were not accepted.

2) Likert-scale numeric data collection coupled with demographic information.

3) Blind data collection as to actual person responding. No indication of possible tracking.
Demographic Profile

Purpose: Create Demographic Profile of user class

Topics

- Age
- Sex
- Gender
- Education level
- Undergraduate major
- Graduate subject if applicable
- English as first language?
System Profile

Purpose: Determine hardware and software constraints.

Topics

Bandwidth
ISP/cost to user
Window/Mac/Unix/Other
Monitor size
Monitor color depth
Browser preference
Browser version

Model Questions

I connect to the web via:
☐ Ethernet  ☐ Cable modem  ☐ 56.6 modem  ☐ 14.4 modem  ☐ other

My operating system is: (check all that apply)
☐ Windows  ☐ Macintosh  ☐ Unix/Linux  ☐ Web TV  ☐ other

Monitor Size:
☐ ☐ ☐ ☐ ☐

Number of available colors:
☐ 1-bit  ☐ Greyscale  ☐ 256  ☐ Thousands  ☐ Millions

I browse from:
☐ Work  ☐ Home  ☐ Library  ☐ "Internet Cafe"  ☐ other

I browse with: (indicate version)

Explorer  Navigator  Other
☐ ☐ ☐ ☐ ☐ 2 3 4 5 6 2 3 4 5 6 ☐

5.5
Proficiency Self-Reporting

Purpose: Establish user's proficiency with software, hardware, information systems, and web browsers.

Topics

- Search engine use
- Download files (e.g. pdf, ps, etc.)
- Software installation
- Hardware maintenance

Model Question

I would describe my skill at searching for information on the web as:

Very Low | Average | Very High
---|---|---
0 | 1 | 2 | 3 | 4

Downloading files (pdf, ps, etc.) is:

Difficult | Easy
---|---
0 | 1 | 2 | 3 | 4

I require help installing and maintaining hardware:

Always | Sometimes | Never
---|---|---
0 | 1 | 2 | 3 | 4

I require help installing software:

Always | Sometimes | Never
---|---|---
0 | 1 | 2 | 3 | 4
Behavior Self-Reporting

Purpose: Determine web use behavior patterns.

Topics

- Frequency of use
- Duration of use

Model Question

I use the web:

- Almost Never (0)
- Weekly (1)
- Daily (4)

When browsing the web, I stay on for:

- Just a few minutes (0)
- 30-40 minutes (3)
- Several hours (4)
Search Engine Use

Purpose: Determine preferred search engine.

Model Question

When researching a topic on the web, I use: (indicate frequency)

<table>
<thead>
<tr>
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<tr>
<td>Webcrawler</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Values: 0, 1, 2, 3, 4
Keywords to Test

Purpose: Establish relevance of keywords and topics used in search engine context. Reduce list to approximately a dozen

<table>
<thead>
<tr>
<th>Fields</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology</td>
<td>Earthquakes</td>
</tr>
<tr>
<td>Geosciences</td>
<td>Volcanos</td>
</tr>
<tr>
<td>Geological Sciences</td>
<td>Tsunamis</td>
</tr>
<tr>
<td>Sedimentology</td>
<td>Plate Tectonics</td>
</tr>
<tr>
<td>Mineralogy</td>
<td>Environment</td>
</tr>
<tr>
<td>Seismology</td>
<td>Mass Spectrometry</td>
</tr>
<tr>
<td>Geophysics</td>
<td>Electron Microscopy</td>
</tr>
<tr>
<td>Geography</td>
<td>Isotope Geochemistry</td>
</tr>
<tr>
<td>Geographic</td>
<td>Radioisotope Dating</td>
</tr>
<tr>
<td>Geochemistry</td>
<td></td>
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<tr>
<td>Paleontology</td>
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<td>Paleobotany</td>
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<tr>
<td>Hydrology</td>
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<tr>
<td>Petrology</td>
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<tr>
<td>Crystallography</td>
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<tr>
<td>Geodynamics</td>
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<tr>
<td>Oceanography</td>
<td></td>
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<tr>
<td>Climatology</td>
<td></td>
</tr>
<tr>
<td>Environmental Geology</td>
<td></td>
</tr>
</tbody>
</table>

Model Question

Assume that you are using your favorite search engine to locate information relevant to your interest in geology. How likely are you to use these keywords? Mark the box which you feel best applies.

<table>
<thead>
<tr>
<th>Not likely</th>
<th>Very Likely</th>
</tr>
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<tbody>
<tr>
<td>Geodynamics</td>
<td></td>
</tr>
<tr>
<td>Petrology</td>
<td></td>
</tr>
</tbody>
</table>
User Expectations

Purpose: Allow user to discuss their information needs.

Model question:

Provide a few examples of the type of information you would expect to be available at a web site whose purpose was recruiting graduate students in the field of geology.
Preliminary Design Testing

Purpose: Test the effectiveness of a blind survey of people expressing an interest in our graduate program for the fall of 2001.

It is unclear what rate of return and level of accuracy to expect from a group as nebulously defined as this. Therefore, this survey is intended to provide an indication of the effectiveness of this approach as well as returning usable data.

Constraints:

For this preliminary study it has been decided to limit the survey to mailing addresses within the US only. In part, this will hold down mailing costs. Additionally, the decision to provide BRM envelopes precludes international return mailing. A final factor which particularly influences this decision is the high percentage of addresses from the People's Republic of China, where access to the web is tightly controlled. As the accepted and admitted student will be part of a focus group during their orientation week, they have been omitted as well. From an initial list of 243 addresses this leaves 112 potential respondents.

The mailing will be sent out in the first week of August, 2001. The survey will be considered closed on November first. The following three pages constitute the Version 1.0 Mailing.
The world-wide-web has become an ever-present reality. In this rapidly changing environment it is easy to lose sight of what matters to the users of web-based services. The Department of Geological Sciences at the University of Michigan is conducting a study of web usage among our various constituent groups. Because you have recently expressed an interest in our graduate programs, we would appreciate your feedback.

Information collected in the course of this study is completely anonymous. Its purpose is to allow us to construct web-based resources that better serve the three-part mission of the University: teaching, research, and public service.

We hope that you will give us a few minutes of your time to complete the attached survey. Thank you and good luck in all your academic endeavors.

Sincerely,

Dale Austin
Webmaster
Geological Sciences
Web User Survey

About you. (mark boxes which apply)

My Age Is: ______________________

Education level completed:
☐ High School ☐ 2-year college ☐ Bachelor (major) ☐ Masters ☐ Ph.D.

Is English your first language?
☐ Yes ☐ No

About your computer. (mark boxes which apply)

I connect to the web via:
☐ Ethernet ☐ Cable modem ☐ 56.6 modem ☐ 14.4 modem ☐ other

My operating system is: (mark all that apply)
☐ Windows ☐ Macintosh ☐ Unix/Linux ☐ Web TV ☐ other

Monitor Size:
☐ 15 inch or under ☐ 17 to 19 inch ☐ above 19 inch

Number of available colors:
☐ 1-bit ☐ Greyscale ☐ 256 colors ☐ Thousands ☐ Millions

I browse from:
☐ Work ☐ Home ☐ Library ☐ School ☐ “Internet Cafe” ☐ other

I browse with: (indicate version)

Explorer 2 3 4 5 6 Navigator 2 3 4 5 6 Other

You and your computer. (mark boxes which apply)

I would say my skill searching for information on the web is:

Very Low Never Sometimes Always

For me, downloading files (pdf, ps, etc.) is:

Difficult 1 2 3 4 Easy

I need help installing and maintaining hardware:

Always 0 Sometimes 2 Never 4

Geological Sciences

Searching the Web

When researching a topic on the web, I use: (mark box to indicate frequency)

Never Sometimes Always

Lycos 1 2 3 4

AltaVista 1 2 3 4

Yahoo 1 2 3 4

Google 1 2 3 4

Excite 1 2 3 4

HotBot 1 2 3 4

Webcrawler 1 2 3 4

Other: 1 2 3 4

I require help installing software:

Always 0 Sometimes 2 Never 4

I use the web:

Almost Never Weekly Daily

When browsing the web, I stay on for:

Just a few minutes 2 3 4 5 6 7

30-40 minutes 2 3 4 5 6 7

Several hours 2 3 4 5 6 7
Assume that you are using your favorite search engine to locate information relevant to your interest in geology. How likely are you to use these keywords? Mark the box which you feel best applies.

<table>
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<td></td>
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<tr>
<td>Mineralogy</td>
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<tr>
<td>Seismology</td>
<td></td>
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<tr>
<td>Geophysics</td>
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<tr>
<td>Archaeological Geology</td>
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<tr>
<td>Geochemistry</td>
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<td>Paleontology</td>
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<table>
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<td>Geodynamics</td>
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<td>Oceanography</td>
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<td>Palaeoclimatology</td>
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<td>Environmental Geology</td>
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<td>Earthquakes</td>
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<td>Structural Geology</td>
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<tr>
<td>Plate Tectonics</td>
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<tr>
<td>Environment</td>
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<tr>
<td>Marine Geology</td>
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<td>Economic Geology</td>
<td></td>
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<tr>
<td>Isotope Geochemistry</td>
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<tr>
<td>Geochronology</td>
<td></td>
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<tr>
<td>Biogeochemistry</td>
<td></td>
</tr>
</tbody>
</table>

**Comments:**

Provide a few examples of the type of information you would expect to be available at a web site whose purpose was recruiting graduate students in the field of geology.
Discussion

Online feedback collection is a tool which must be used with care. It is impossible to control the statistical validity of responses to this type of survey. At the same time, this method offers the virtue of immediacy and a high level of contextualization. The user is, presumably, engaged in the very tasks which are under study. The user is also likely to be more motivated to respond if they have encountered some problem.

The most serious limitation of this process is the notoriously brief attention span for the typical web-user. Thus, online feedback forms must be short and simple to use. Otherwise, the data collection effort itself becomes one of the site's failings.

Since the range of information desired is beyond the scope of a single feedback form, a more effective approach would be a series of feedback forms, each addressing a different topic. These simple forms would then be rotated periodically—perhaps even shifted within the site's architecture in order to increase contextual relevance.

The initial implementation of an online feedback form would entail a post-method email form directed to the webmaster, who would be responsible for incorporating the response into a database. Subsequent implementations should concentrate on a direct-to-database solution.
Example: LSA Feedback Form

This is a screen shot of the LSA Feedback Form in place for July, 2001. Its virtue is simplicity. While the demographic collection is probably underpowered, it at least provides some basic user type information. The questions are somewhat vague. The second in particular is bound to create confusion. The user has no idea what constitutes a special consideration in this context.
Discussion

Online feedback collection is a tool which must be used with care. It is impossible to control the statistical validity of responses to this type of survey. At the same time, this method offers the virtue of immediacy and a high level of contextualization. The user is, presumably, engaged in the very tasks which are under study. The user is also likely to be more motivated to respond if they have encountered some problem.

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Website Feedback V1.0: Form

U-M Geological Sciences: Website Feedback

Thank you for visiting The Department of Geological Sciences on the Web. Please take a moment to help us improve our services by offering your comments and suggestions.

How did you locate www.geo.lsa.umich.edu?

What were you looking for at our site? Did you find it?

Comments and suggestions:

Send to Webmaster

Department of Geological Sciences
University of Michigan

Webmaster: mzwizard@umich.edu
Department of Geological Sciences, University of Michigan
2314 E. Liberty Building, 425 East University
Ann Arbor, Michigan 48109-1063
(734) 764-1435 FAX (734) 764-4695
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Last Modified 12 September, 2003 10:34
www.geo.lsa.umich.edu

Usability Testing: Phase 1–Exploratory
Purpose

Determine:

Does the current site topology and logic follow the information schema of our intended users?

Do the indicated links from index.html provide a rich enough schema to direct users to their task?

Does the rhetoric of arrival at various documents within our web site provide enough context that the user will recognize failure or success at their task immediately?
Test Objectives

How well can a first-time user identify the information behind each link from index.html?

Can the user apply to graduate school?

Can the user ask questions about applying to graduate school?

Can the user locate a field school course?

Can the user find out where to mail something to "Tom Merline?"

Can the user locate someone to answer their questions about earthquakes?
User Profiles

User Group 1.0: Recently Admitted Graduate Students
User Group 2.0: Previously Admitted Graduate Students
User Group 3.0: Faculty
User Group 4.0: Staff
User Group 5.0: General Public
User Group 6.0: Elementary Teachers
User Group 7.0: Journalists

Each User Group can be further broken down into subclasses. User Group 1.0 will be used for the Exploratory Phase. They represent the group easiest to acquire in the present environment. Subclasses for this User Group are:

<table>
<thead>
<tr>
<th>User Group 1.0: Recently Admitted Graduate Students</th>
<th>Have used geo.lsa.umich.edu</th>
<th>Have not used geo.lsa.umich.edu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native English Speaker</td>
<td></td>
<td></td>
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<tr>
<td>English as a Second Language</td>
<td></td>
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</tbody>
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Test Environment

The department has neither the space or the budget for a formalized testing facility, even a temporary one. Under typical industrial conditions there would at least be a dedicated room and computer system. Video recording is also common in formal testing. We must compromise testing formality in order to be able to test at all.

Tests will be conducted at the work stations assigned to the graduate students. Where possible, other students will be not be present. If this is not possible, the nature of the test will be explained to others, and they will be asked to refrain from "helping" the test participant. The specific conditions under which the test occurs will be recorded.
**Test Monitor Role**

1) Introduce test

2) Collect subject demographic information and record testing conditions.

3) Assign, one at a time, tasks for the subject to perform.

4) Record time to complete task successfully. In cases of task failure, indicate time to subject's first verbal indication of failure.

5) Collect impressions and comments for post-test review with subject.

6) Serve as "help desk" for computing issues not a part of the web site itself.

7) Write up summary and test log for each subject.
**Evaluation Measures**

1) Has the task been completed successfully? If partial success has been achieved, at what level?

   Task Status definitions
   Success
   1: By designed method
   2: By alternate route

   Failure
   1: Failure to achieve assigned task
   2: Failure to achieve assigned task without guidance

2) How long did it take for the subject to achieve success or terminally fail in the task?

3) What comments did the subject make during the task which relate to site design?

4) What questions should be asked of this subject during post-test discussion?
Bibliography


