

Designing Search Pages

Scott McDaniel

Many web sites and applications include a search feature. Often they provide an extremely simple search interface consisting of a single text box and a “Go” button. Sometimes, however, the users’ tasks call for more sophistication, and guidelines for complex search interfaces are difficult to find.

This paper details four levels of search interface, and it provides heuristics (guidelines) to use when designing complex search interfaces. Different solutions are appropriate, depending on the users’ motivation and knowledge of their subject, experience using search interfaces, and search goals. Finally, PubMed serves as a useful example to illustrate how these guidelines can be used to analyze existing search interfaces.

INTRODUCTION

A core principle of user-centered design is that products should support their users’ tasks. The best solutions depend both on who the users are and what their tasks are. There is no single solution, therefore, to common design problems, such as the best way to present users with a search page.

Complex search interfaces must take into account user motivation and knowledge, search experience, and search goals.

LEVELS OF SEARCH

Search interfaces tend to come in four common styles, particularly on the web.

Single Text Box

Internet search engines like Google best exemplify the Single Text Box type of search interface. The user is supposed to enter one or more search criteria and click a button to initiate the search. They then receive a set of results, and what they are looking for is hopefully at or near the top of those results.

Single Text Box interfaces are also common in e-commerce sites, like Amazon.com. In Amazon’s case, there is also a *scoping mechanism* that is initially set to everything that Amazon sells. The user does not have to touch the drop-down list above the text entry box, and the search will work fine. This is called a global scope since it searches everything on the site. If users wish, they can set the scope more narrowly, for example “Books.” In general, it is a good idea to set the scope

globally if you use a scoping mechanism and then let users narrow it if they wish.

Basic Search

A Basic search interface typically involves just a few search fields – only the most common or useful ones. There may be a couple of other options, such as allowing users to set the number of results to appear on each results page. Still, there is not a great deal of complexity in a Basic search interface, and the priority is still on getting searchers to their results rather than complete flexibility to search using every possible criterion. Amazon.com’s search page within their Books tab is a good example of a Basic search interface.

Advanced Search

On an Advanced search screen, the emphasis is on allowing the user maximum flexibility in how they search. Advanced search interfaces let users search on every possible field, but they also put more of a burden on the user to learn and understand the interface. In this case, efficiency and ease-of-learning take a back seat to the ability to construct a precise and effective query.

Advanced searches sometimes resemble Basic searches, except that the page is longer and includes every possible search field. Other times, as with PubMed, an Advanced search resembles a Single Text Box with added features. In PubMed’s case, the system can remember and display previous searches on separate lines. Users can then combine those searches using Boolean operators.

Power Search

Power searches look like Single Text Box searches, though the text box itself is usually bigger. There is a place for the searcher to enter the query and then click a button to submit the query. The Power search interface assumes that the users know the query language for the database itself and can enter their request directly.

SEARCH GUIDELINES

The body of research on search interfaces is limited. Much of the research that has been done focuses on e-commerce and shopping web sites.

For example, Nielsen has found that users don’t often use advanced search features, such as Boolean operators, and that their search queries are most often one or two

words. Spool has found that users tend to be more successful at finding items they want to buy when they follow a linking structure than when they search. He also found that their success rate did not improve when users had advanced search features available or search tips on screen. Both Spool and Nielsen, however, have focused largely on online shopping web sites. Their findings do not necessarily apply to academic databases, for example, or to trained librarians (nor do I believe that they were meant to).

When designing a user-centered user interface, context matters. It would, therefore, be difficult to provide a useful set of heuristics, or guidelines, for search interfaces that pertain to every situation. This paper details three dimensions along which a searcher's context may vary:

- Type of User
- Search Experience
- Search Goal

For a particular search interface, characterize the users and their tasks on these dimensions to arrive at a set of heuristics that is specific to the context.

Type of User

The type of user refers to both how well your users know the subject and how motivated they are to find the object of their search.

Casual Searcher

Casual searchers know relatively little about the object of their search, and they have relatively low motivation to stick with it if they do not get exactly what they want on the first or second try. The typical e-commerce shopper would fit into this category when browsing a web site for products. Guidelines for the Casual Searcher include:

- Offer a simple search box on the home page and on each page throughout the site.
- Present information in the search results that allows users to assess relevance.
- Allow Casual Searchers in an e-commerce setting to search for things other than products.
- Allow Casual Searchers to search for items with their own vocabulary.

Interested Layperson

The Interested Layperson knows a moderate amount about the subject area – though perhaps his or her learning has been recent. This category also includes people with little knowledge of the subject but high motivation to find their objective. Guidelines for the Interested Layperson include:

- Allow searching for both common terms and specialized terms.
- Provide extra help with refining searches.
- Consider alternatives to free text entry search.
- Keep the search interface simple, but provide access to an advanced search interface.

Subject Matter Expert

Subject Matter Experts (SME) know a great deal about the subject, and they are often professionals in that area. They typically have high motivation to find their objective. Guidelines for Subject Matter Experts include:

- Learn enough of the subject field to understand what your SMEs search for and how they search.
- Allow SMEs to save both their search parameters and their search results.
- Don't assume that SMEs understand advanced searching concepts.
- Provide SMEs with enough information in the search results to decide whether a given item is relevant.

Search Experience

Search experience refers to both the length of time the user has been using search interfaces as well as the frequency of that use.

Novice

Novice searchers have never used a search interface or have done so only infrequently. To them the Single Text Box with a Go button is their idea of searching. Guidelines for Novice searchers include:

- Consider alternatives to a search engine.
- Global search is better than a scoped search.
- Lead Novice searchers through the search dialogue.
- Present the search results clearly and simply.

Intermediate

Intermediate searchers have a moderate amount of experience using search pages. They understand and can do basic Boolean searches. Also, they make assumptions based on common search practices – for example, they may use an asterisk as a wildcard even if it is in fact a different character. Guidelines for Intermediate searchers include:

- Clearly state the search rules.
- Provide Intermediate users with a clear path for searching, but allow them to deviate from it if they wish.
- Give Intermediate users flexibility with the search results presentation.

- Provide Intermediate users with access to advanced features, but don't make understanding them critical to success.

Advanced

Advanced searchers have been professionally trained in search techniques or typically have been professional searchers, like librarians. They think not in terms of individual queries, but rather in terms of entire search strategies. Guidelines for Advanced searchers include:

- Provide clear access to advanced search features, and make the full range of functionality obvious.
- Help Advanced searchers execute not only individual queries, but entire search strategies.
- Allow Advanced searchers to enter the entire query in a free text box if you are using a known query language (Power search).
- Allow Advanced searchers to determine the information displayed in a results set, as well as the sort order.
- Provide Advanced searchers reference assistance rather than procedural assistance with their task.

Search Goal

Search goal refers to the object of the search. The three types of search goals differ based on what the searcher would characterize as a successful outcome.

Precision

In Precision searches, the user knows that the target items exist and he or she merely needs to locate them in the search results. Usually there is only one target or just a few. Finding them constitutes a successful search. The typical strategy for a Precision search is to start with specific search criteria and then narrow that search until the object has been found. Guidelines for Precision searches include:

- Give the user what is needed to locate a unique item and no more.
- Make it easy to narrow search results. (For example, by allowing users to narrow the search scope.)
- Include the information in the search results that allows users to uniquely identify the target of their search.

Recall

Recall searches seek to find all items that meet given criteria. A literature review for a research project falls into this category. The searcher does not know which items are even out there that match the criteria and he or she wants to find out what they are. The typical strategy for a Recall search is to start with specific criteria and then expand the search to include synonyms and related items. Guidelines for Recall searches include:

- Make it easy to evaluate individual result items.
- Allow users to save and resume Recall searches.
- Make it easy to expand searches as well as narrow them.
- Make it easy to search globally.
- Accept word variants, word stemming, and synonyms for search terms.

Some Good Items

A Some Good Items search includes elements of both Recall and Precision Searches. The goal is to find the best few items that meet given criteria. Like a Precision search, the goal is to locate one or only a few results. Like a Recall search, the user does not know what those items are before the search. A Some Good Items search is the only kind in which a relevance measure is appropriate, since that relevance will determine what the "best" items are. Guidelines for Recall searches include:

- Follow the guidelines for a Recall search.
- Make a simplified reference interview an optional part of the search process. (A reference interview is a technique librarians use to find out from their patrons what will be most useful to them.)
- Support the task of creating a short list of results.

Assembling the Guidelines

I have found it useful to apply these dimensions and guidelines to personas (user models) I am creating for applications that use search. First, I determine which values apply to the persona for each dimension. I then take the guidelines associated with those values and create a list of heuristics that apply to the specific situation.

You can also look at an existing search interface to see for whom it was designed. Let's take the case of PubMed.

ANALYZING PUBMED

PubMed (www.pubmed.org) is a service of the National Library of Medicine and the National Center for Biotechnology Information. It allows medical professionals to search the body of medical and scientific literature, finding citations and abstracts of academic papers. We can use the guidelines presented above to determine PubMed's target users and see how it fits their needs.

Target User Type

PubMed's target users are Subject Matter Experts, indicating this set of guidelines:

- Learn enough of the subject field to understand what your SMEs search for and how they search.
- Allow SMEs to save both their search parameters and their search results.
- Don't assume that SMEs understand advanced searching concepts.
- Provide SMEs with enough information in the search results to decide whether a given item is relevant.

In this case, the user interface requires a certain amount of medical knowledge to use effectively. For example, the scoping mechanism includes categories like GEO, GEO Data Sets, OMIM, and UniGene, which mean little to a layperson.

PubMed preserves a search history, effectively allowing users to save their searches for a short time. They can also go to a Details tab for each search and see the complete query language version of the query. If the user saves this in a separate document, they can perform common searches repeatedly by copy and pasting.

Search results are keyed to the authors, an essential field in academic searching. The full citation appears, however, along with a link to an abstract or details page for each result.

Target Search Experience

PubMed's users also tend to be Advanced searchers, though Intermediate searchers would not get too lost. The applicable guidelines for Advanced searchers are:

- Provide clear access to advanced search features, and make the full range of functionality obvious.
- Help Advanced searchers execute not only individual queries, but entire search strategies.
- Allow Advanced searchers to enter the entire query in a free text box if you are using a known query language.
- Allow Advanced searchers to determine the information displayed in a results set, as well as the sort order.
- Provide Advanced searchers reference assistance rather than procedural assistance with their task.

PubMed contains a variety of advanced search features. For example, the ability to see the actual query language, alter it, or enter the search directly in it is clearly a feature for Advanced searchers.

PubMed also supports the execution of search strategies. Its Preview/Index feature lets users enter searches and, rather than going directly to the results set, see the number of hits that the search produces. Users can use either the Preview/Index feature or the History feature to combine previous searches, allowing users to build

extremely complex and detailed searches with relatively little effort. It also allows a great deal of control over the results set itself, allowing users to determine the fields shown and the format they would like to use. PubMed also allows searchers to save search results as text files, useful for future research.

Target Search Goals

PubMed supports all three search goals: Recall, Precision, and Some Good Items searches. This leads to the following guidelines:

- Give the user what is needed to locate a unique item and no more.
- Make it easy to narrow search results.
- Include the information in the search results that allows users to uniquely identify the target of their search.
- Make it easy to evaluate individual result items.
- Allow users to save and resume Recall searches.
- Make it easy to expand searches as well as narrow them.
- Search globally.
- Make a simplified reference interview an optional part of the search process. (A reference interview is a technique librarians use to find out from their patrons what will be most useful to them.)
- Support the task of creating a short list of results.

Through its History and Preview/Index features, PubMed makes it easy to both narrow and expand searches. Another useful feature allows users to save specific search results and create their own unique sets of search results. Whenever looking at a results page, users can select items of interest and then add them to a Clipboard – a type of shopping cart for search results. The Clipboard retains up to 500 items for up to 8 hours. As you can on search results pages, it also lets you save the search results in a format of your choice.

SUMMARY

The usefulness, and usability, of a search interface depends a great deal upon its context of use. While we know a great deal about simple search interfaces for e-commerce web sites, less guidance has been available for other specialized needs. The guidelines presented here can serve as practical assistance to the user interface designer faced with the task of fitting search screens to their users.

REFERENCES

- (1) Cognetics Corporation. 1995. "User interface standards and guidelines for interactive TV programs: Discussion paper on searching for

- information (from scanning to complex searches) and assisting the viewer.” Unpublished
- (2) De Jong, M., Van Der Geest, T. 2000. Characterizing Web Heuristics. *Technical Communication*. Society for Technical Communication. 47:3:311-325.
 - (3) Koyani, S. and Bailey, R. Searching vs. Linking on the Web: A Summary of the Research. Communication Technologies Branch, National Cancer Institute, 2002.
 - (4) McDaniel, S. and McDaniel, M. 2002. The Big Dig: Mining Nuggets of Value. *User Experience*, 1:2, 20-29.
 - (5) McDaniel, S. and Drummond, L. 2003. Providing Your Users With An Effective Search Page: A Case Study. Proceedings of the 2003 Usability Professionals Association Conference.
 - (6) Nielsen, J. 1997. Search and You May Find. Jakob Nielsen’s Alertbox. <http://www.useit.com/alertbox/9707b.html>
 - (7) Nielsen, J. 2001. Search: Visible and Simple. Jakob Nielsen’s Alertbox. <http://www.useit.com/alertbox/20010513.html>
 - (8) Nielsen, J., Molich, R., Snyder, C., Farrell, S. 2000. E-Commerce User Experience: Search. Nielsen Norman Group.
 - (9) Quesenbery, W. 2001 On Beyond Help: Meeting User Needs For Useful Online Information. *Technical Communication*. Society for Technical Communication. 48:2: 182-188.
 - (10) Shneiderman, B. 1998. Information Search and Visualization. *Designing the User Interface: Strategies for Effective Human-Computer Interaction*. Reading, Massachusetts. Addison-Wesley. 509-549.
 - (11) Spool, J., Scanlon, T., Schroeder, W., Snyder, C., DeAngelo, T. 1999. *Web Site Usability: A Designer’s Guide*. San Francisco, California. Morgan Kaufmann Publisher’s, Inc. 49-58.
 - (12) Walker, G., Janes, J. 1999. *Online Retrieval: A Dialogue of Theory and Practice*. 2nd edition. Englewood, Colorado. Libraries Unlimited, Inc.
 - (13) www.usability.gov/guidelines

software, networks, and telecommunications systems. As a designer, he helps establish vision and direction for products, researches prospective users, determines requirements, and provides detailed designs and specifications for both software and web products. He is a member of the Usability Professionals Association (UPA), The Society for Technical Communication (STC) and founded and managed the STC DC Usability Special Interest Group.

Scott McDaniel
 Interaction Designer
 Cognetics Corporation
 1320 Fenwick Ln., Suite 209
 Silver Spring, MD 20910 USA
 (301) 587-7549

Scott McDaniel is a user-centered designer with more than 8 years of experience in designing and documenting