Although a great deal of attention has been paid to the search features of Web search engines, far fewer evaluations exist for the features and functionality of traditional online databases that have migrated to the Web.
The professional literature on online database searching has concentrated on the formulation of effective search strategies and the design of intuitive and user-friendly interfaces, while academic studies have focused on end-user search behavior that influences the design of information retrieval systems. The popular computing press has almost totally ignored the online systems that librarians have used for the past two decades. As traditional online hosts increasingly prefer their customers use the Web, a system-by-system analysis of the wide array of commonly expected functionality is timely.

We originally chose seven systems—DialogWeb, Factiva’s Dow Jones Interactive (DJI) Publications Library, OCLC’s FirstSearch Service, ProQuestWeb, WilsonWeb, Ovid, and SilverPlatter—for their excellence of design, quality of data included, and varied business models. LEXIS-NEXIS introduced its nxis.com shortly after we completed our assessment, so we went back and added it as an eighth system.

These systems are not homogenous; each one brings something a little different in terms of information architecture to the searching table. As well as providing search interfaces, WilsonWeb abstracts and indexes as a database producer, OCLC is a library consortium network that produces a union catalog and other proprietary databases, DialogWeb, DJI, LEXIS-NEXIS, Ovid, and SilverPlatter are commercial database aggregators (serving very different markets).

Collectively, these companies and organizations serve the research needs of corporate, public, and academic libraries, and the financial sector. Although they are not an exhaustive sampling of resources for information centers, they are representative of traditional services on the Web. Other systems to consider include EBSCO Online, Cambridge Scientific Abstracts, and the Gale Group. We hope this survey will provide a framework for information professionals to assess Web-based online databases for functionality, usefulness, and value for money.

**EVALUATION CRITERIA**

We first chose five major categories to assess Web-based online hosts—Database Selection, Formulation and Reformulation of Searches, Help Mechanisms, Results Presentation and Organization, and Record Management. We then identified features under each category as either essential, desirable, or wanted for special needs. Issues of interface design and navigation were intentionally not included, as rating them would rely on subjective assessment. [Editor’s note: The characterizing of features as essential, desirable, or wanted for special needs may be equally subjective, and ONLINE would love to hear from any readers who take issue with these designations.]

We didn’t try to “peep under the hood” and make an educated evaluation of the search rules of each system. Finally, full-text retrieval from the abstracting and indexing database interfaces evaluated here was not accessed because to do so would have vastly expanded the scope of this survey, and could be better served through an additional study. (Diane Hoffman’s article in the January 2001 issue of ONLINE, “Think Links: Full-Text Linking Projects”, is a good start.) Once we had the criteria in place, we turned to the database systems. How close did they come to being our ideal system?

**FUNCTIONALITY CATEGORIES**

Under Database selection, we identified two important features—database identification aids and ability to search more than one database simultaneously. Seasoned researchers and information professionals know their sources. Students and more occasional users may not, so database identification aids are extremely helpful in locating what they need. Database identification aids allow researchers to identify the database most likely to contain the information they need. These range from subject-specific category listings to a keyword search that matches to a database with the most frequent occurrence of the desired term. Investigation of database information (including producer and field information) before entering the interface and making a database selection is usually presented in the form of an “T” (information) link next to the database selection box.

Searching multiple databases simultaneously seems self-explanatory, and all systems examined allow it, but with different degrees of transparency. This frequently reflects the original, non-Web functionalities. In classic Dialog, for example, the searcher had to actively decide which specific databases to search, while both the Publications Library of Dow Jones Interactive and LEXIS-NEXIS pre-grouped databases. In the Publications Library, of Web-Based Versions of Traditional Search Engines

Luisa Sabin-Kildiss, Colleen Cool, and Hong (Iris) Xie
**Evaluation Criteria**

<table>
<thead>
<tr>
<th>Criteria Database Selection</th>
<th>Formulations/Reformulation of Search</th>
<th>Help Mechanism</th>
<th>Result Presentation and Organization (Record View)</th>
<th>Result Presentation and Organization (Record-Limiting Options)</th>
<th>Result Presentation and Organization (Display of User-Specified Records)</th>
<th>Record Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification aids</td>
<td>Indexes</td>
<td>Easily located</td>
<td>Search statement included in record view</td>
<td>Limit to date range</td>
<td>Ability to select All records on a page</td>
<td>Provision of clean print format</td>
</tr>
<tr>
<td>Simultaneous database searching</td>
<td>Varied search experience interface levels</td>
<td>Well organized</td>
<td>Search terms highlighted</td>
<td>Limit to publication type</td>
<td>Ability to deselect All records on a page</td>
<td>Inclusion of search statement in print format</td>
</tr>
<tr>
<td></td>
<td>List search set from current session</td>
<td>Field information provided</td>
<td>Number of viewable records can be user-defined</td>
<td>Limit to latest update</td>
<td>Select records for display in another format</td>
<td>Different file-save formats</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Remove duplicate records</td>
<td>Limit to institutional holdings</td>
<td></td>
<td>Facility to send records in body of email</td>
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<td>Facility to send records as an email attachment</td>
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<td>Ability to send email attachments with different file format/encoding methods</td>
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<td>Save results independent of browser</td>
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</table>

the database names are obscured in favor of journal titles.

**FORMULATION/REFORMULATION OF SEARCHES**

Searchers have varying levels of expertise. Some are highly skilled; others are intermittent, first-time, or thoroughly naive searchers. Others have gained familiarity with Web search engines. Online database Web interfaces certainly lend themselves to ease of use for those users, though searchers familiar with command line searching are sometimes frustrated at losing the control and precision they are accustomed to.

However, in the Formulation and Reformulation of Searches category, we looked generally at the functionality of the systems in allowing the complex searching that appeals to information professionals.Browsable indexes, for example, facilitate field searching.

Recognizing that not all searchers have the same level of proficiency, we thought that a Varied search experience interface level was essential. A relevant question is: how many levels are needed? It is unlikely to see an interface with only one, expert command line search at this point in time. The Web interface itself allows for greater flexibility in providing access to a variety of search interfaces within an individual system. Most systems have two: a quick or advanced search. OCLC's FirstSearch is in the running with an Intermediate-level search. Also deemed essential was the ability to list the search sets from the current session. This feature allows the user to keep track of all searches within a current session, and to return to search set results without re-keying the search.

Under the Desirable features, we included Vocabulary mapping (allowing the user to relate an initial search term to a pertinent subject heading). Some interfaces provide access to online thesauri where terms can be mapped to broader, narrower, and related terminology to focus a search. However, not all databases within a system are necessarily provided with this type of search tool. The ability to combine search sets we also felt was desirable. It gives searchers the flexibility to refine searches as they gain greater understanding of the topic being researched. This is a technique in common usage with the traditional versions of online search engines, but uncommon in newer Web search engines...
Web-Based Version of Traditional Search Engines Functionality Chart

<table>
<thead>
<tr>
<th>Database Selection</th>
<th>YES</th>
<th>YES</th>
<th>YES</th>
<th>NO</th>
<th>NO</th>
<th>NO</th>
<th>YES</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can search more than one database simultaneously?</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

**Formulation/Reformulation of Search**

| Indexes? | YES | YES | YES | YES | YES | YES | YES | YES |
| Vocabulary mapping? | YES | NO | YES | NO | NO | YES | YES | YES |
| Hotlinked subject terms? | YES | NO | YES | YES | YES | NO | YES | NO |
| Hotlinked author names? | YES | NO | YES | YES | YES | YES | YES | NO |
| Varied search experience interface levels? | YES | NO | YES | YES | YES | YES | YES | YES |
| Command line field searching capability incorporated? | YES | YES | YES | YES | NO | YES | NO | YES |
| Save Search strategies for future sessions? | YES | YES | NO | YES | NO | YES | YES | NO |
| List search sets from current session? | YES | YES | YES | YES | YES | YES | NO | NO |
| Combine search sets? | YES | NO | YES | YES | YES | YES | NO | NO |

**Help Mechanisms**

| Easily located? | YES | NO | YES | YES | YES | YES | YES | YES |
| Well organized? | NO | YES | YES | YES | YES | YES | YES | YES |
| Field information provided? | YES | NO | YES | YES | YES | YES | YES | YES |
| Contextual help available? | YES | YES | YES | YES | NO | NO | YES | YES |

**Result Presentation and Organization**

**1. Record View**

| Search statement included in record result view? | YES | YES | YES | YES | YES | YES | YES | YES |
| # of viewable records can be user-defined? | YES | NO | YES | YES | NO | YES | YES | YES |
| Remove duplicates (multiple databases)? | YES | YES | NO | YES | NO | YES | NO | NO |
| View result list records by user specified fields? | NO | YES | NO | NO | YES | YES | YES | YES |
| Search terms highlighted? | NO | YES | NO | NO | YES | YES | YES | YES |

**2. Display of User-Specified Records**

| Select records for display in another format? | YES | YES | NO | YES | NO | YES | NO | NO |
| Original record # retained after selection? | YES | NO | NO | NO | NO | NO | NO | NO |
| Ability to select "ALL" records on a page? | YES | YES | YES | YES | NO | YES | NO | NO |
| Disselect marked records? | YES | YES | YES | YES | NO | NO | NO | NO |
| Sort marked records? | NO | NO | NO | YES | NO | NO | NO | NO |

engines that are more likely to encourage people to re-input terms until they get what they want.

When it comes to Desirable but serving special needs, we picked four features—Hotlinked subject terms, Hotlinked author names, Command-line search capability, and Saving search strategies for future sessions.

The beauty of traditional databases is the ability to conduct searches using controlled vocabulary. Hyperlinking on the Web has extended this capability so that a related search on an individual subject term/author can be conducted to get all records with that subject term/author assigned to it. Many searchers desire the power and precision of a command line search that offers sophisticated search techniques for submitting queries to user-specified fields. Most interfaces offer this or a portion of this functionality within their Expert-level search interface. Saving search strategies allows searchers to keep their search history and rerun searches at a later date to keep track of research developments.

**HELP, I NEED SOMEBODY**

The Help Mechanism is one of the most important user-assisted features, which need to be Easily located, Well organized, and have Field information provided. The rate of Desirable is well-placed, thoughtful, contextual help that serves to save the user time and energy in formulating searches with correct syntax.

**RESULT PRESENTATION**

When we considered Result presentation and organization, we divided the category into four sub-categories:
Record view, Display of user-specified records, Record sorting options, and Record limiting options. In the record view, we thought it essential that the search statement be included in the record result list in all cases. This includes the field queried. The inclusion of the search statement in the record view and the highlighting of search terms are rated essential. These small features do much to ensure that the searcher is able to keep focused on his or her search at all stages of the process.

Powerful and highly specialized features include user-specified fields for display in the results list and the ability to sort a marked list in various ways. Not many users will need these functions, but they highlight the sophistication of online information retrieval systems and will be reflected in their cost. User-specified record displays are important because, while some users prefer to navigate record ranges to continuous scrolling, others find duplicate records (when searching multiple databases) waste print and disk space and lead to confusion. Not essential features, these do however streamline usability. The ability to select/deselect "ALL" records and to select records for display in another format are now industry standards. Their usefulness cannot be underestimated. Another feature is retention of the original record numbers in a marked list. This is helpful to those conducting numerous mediated searches and who need to keep careful track of the results.

**SORTING AND LIMITING**

A variety of record-sorting options is encouraged. Relevance ranking is deemed essential because it provides the best results for beginner searchers. The standard chronological sort is listed essentially to facilitate exhaustive date-sorted results. Chronological sort by publication type, chronological sort by author, and chronological sort (ascending, descending) options are deemed specialized features for highly refined searching.

Date-range limit and the limit to publication type are deemed essential. This gives even novice researchers the option of honing in on the type, authority, and time range of the research information they need. Desirable functionality includes limiting to latest update (allowing the researcher to keep abreast of latest records pertaining to his or her topic). This feature can be used in place of the add-on cost of alerting services and other personalization features. Limit to institutional holdings is also a desirable feature (not yet supported by the eight services surveyed). Look out for this one; it has been promised for some time, and will become an essential functionality as online database systems and the library online catalog and electronic full-text access continue to integrate.

**RECORD MANAGEMENT**

Rated essential is the provision of a clean print format, one which is without the clutter of the browser window and any graphics to hinder print speed performance and waste valuable available paper space. (Many academic and public library patrons pay for record output by the page.) Also, the inclusion of the search statement on the clean print format (so users know which search the printed records pertain to) we consider essential.
Out of this informal survey of eight different systems, DialogWeb ranked the highest.

It is essential that different file-save formats are offered. In most systems surveyed, saving is browser-dependent, and contingent on users knowing file extensions and how to use the Windows “save as” file type drop-down menu.

Two systems allow the user to save records through the system and give the options of saving in DOS or Mac OS format. This type of record-saving mechanism is deemed less essential because the “save records” feature essentially just invokes the browser “save as” function (which may be helpful to users completely unaccustomed to the browser “save” and “save as” functions).

It is essential to be able to email records with the search statement in the body of the email for efficient record identification. It is desirable to send records as an email attachment (to facilitate seamless importation of records into a citation manager database such as Endnote or ProCite, for example). If this is offered, then it is desirable to have control of the encoding methods of email attachments (as with Mac Binhex).

THE IDEAL SYSTEM

This section assesses the database systems according to our construction of the “ideal system”. Out of this informal survey of eight different systems, DialogWeb ranked the highest, with 32 out of the 41 listed features. OCLC’s FirstSearch and Wolters Kluwer’s Ovid came in second with 27 out of 41 features, and ProQuest-Web and SilverPlatter ranked third with 26 of the 41 features. In seventh place was nexis.com, with 25 out of the 41, and WilsonWeb ranked last with 20 out of the 41.

The ideal system would include the seven features that DialogWeb does not include. These are:

- A “sort marked records” feature
- A “limit to latest updates”
- A “limit to publication type”
- The inclusion of the search statement in the print format

DialogWeb, then, gets very close to the ideal system, but still misses some important features.

SELECTING THE BEST SYSTEM

It is obvious then that the information professional is confronted with a wide array of choices when it comes to online database systems. The choice amongst them will of course be mitigated by availability of pertinent information resources to that online system, budget considerations, habit, and familiarity or personal preference. However, with such a wide array of functionality available, professionals will want to compare systems to match their (and their users’) needs to that which is available. Having set out the evaluation criteria, we then ran the eight systems through their paces, testing to see which system employed which functional characteristics.

Certainly, not all features are used, or should be used, by all researchers and searchers in every type of institution. Some features make using the system a more streamlined and pleasurable affair, such as selecting/deselecting all records. Essential aids for inexperienced searchers are, for example, database identification aids and vocabulary mapping. Other features cater to the needs of those conducting specific types of research—for example, sorting by author will clarify who has published (and in what amount) on a particular topic.

DATABASE SELECTION

Database coverage is often surprising. For that reason alone, resources like these database identification aids (Dialog’s subject categories and SilverPlatter’s Find Relevant Databases keyword search) can broaden the possibility of finding a variety of pertinent information. Once an assortment of resources is selected, searching multiple databases facilitates expeditious retrieval. These features are rated desirable but are helpful tools if numerous databases are purchased through a single vendor, particularly if a substantial amount of usage will come from end-users.

All systems in this survey are set up for searching multiple databases. DialogWeb, like Dialog Classic, asks the user to specify database file numbers. Ovid and SilverPlatter ask the user to click on database selections before entering the search interface. Dialog provides the ability to find a relevant database before searching, but users cannot access database information until they are in the database. DJI Publications Library and nexis.com encourage you to build your own favorite list of publications to search against.

FORMULATION/REFORMULATION OF SEARCH

All databases looked at here provide a variety of indexes that allow for correct input of term(s) for field searching. The type and number varied by interface and database.

Indexes are rated as essential. They existed in old command line interfaces (Dialog EXPAND command). In Web-based systems, they are easier to locate and manipulate. Varied levels of searching are also essential. Most institutions (corporate, academic, and otherwise) are represented by a wide cross-section of users. Interfaces with various levels (two or at least) are recommended. OCLC’s FirstSearch boasts three search levels. ProQuest lets searchers choose between basic, guided, and natural language. A list of search sets from the current session is also rated as essential; users need to keep track of what they have found and how they found it.

Vocabulary mapping is where nexis.com shines, allowing users to use...
Our evaluation of the Help functionality category contained the most subjective evaluation.

indexes with their own vocabulary which is then mapped to correct system terminology. Ovid does this very nicely, and takes the process one step further by allowing the user to retrieve records where the subject heading(s) derived from the search term are either a subject heading or the main subject heading. These are rich tools for sophisticated searchers who do not necessarily have expertise in the area they are searching in. A "Narrow Search" feature facilitates a streamlined search process with no re-keying. Combining searches painlessly provides the user with expert search skills without needing an understanding of Boolean nesting and order of operation.

Hotlinked subject and author searching are assigned desirable priority. They provide tools for novice searchers that lend pleasure and ease to the search process and allow the user to browse extensively.

Saving searches for future sessions is a sophisticated tool for regular users. It is given a lower priority not because it is a weak feature, but because its usefulness is dictated by the needs of the users of the system. Hardcore users with heavy research and/or mediated search assignments will benefit most by the inclusion of this. In fact, this feature may be indispensable to this specific user group.

HELP, NOT JUST ANYBODY

Help is an extremely important area. Without easily located, well-organized help, using a system to its fullest advantage can be an annoying, frustrating, and unrewarding experience. Conversely, well-organized, comprehensive help can greatly improve user performance and capitalize on the cost-benefit ratio.

Our evaluation of the Help functionality category contained the most subjective evaluation. Help was available in all systems and was easily identifiable. It was just a click away. Most Help information was comprehensive; some was structured and organized so as to provide information to the end-user that was easier for the end-user to locate. Contextual, on-screen help examples—a feature we decided was desirable but not essential—were missing in several systems.

RESULT PRESENTATION AND ORGANIZATION

Most interfaces provide a mechanism for adjusting the number of records viewable on a single Web page, and when multiple databases with overlapping coverage were queried, half the surveyed systems screened out duplicate records. Another practical customization feature offered was that the user be able to define the exact record fields for presentation in the result list. In nearly all the systems, the appearance of the bolded search terms assisted the user to quickly assess the relevance of the record.

Most of the systems allowed users to "Select All" records displayed on a page, saving them the trouble of marking each record individually. Once records are marked, it is useful to be able to change the display to view in another format. A few systems follow the original numbering scheme of the record list (if record #’s 1, 2, 5, 7 from the result list were marked, then the marked list is presented with those numbers intact). Systems without this feature simply present a renumbered list (1, 2, 3, 4, etc.).

A great variety of record-sorting options are available, with some systems presenting more options than others. Relevance ranking is an option in one system, chronological sorting as either an ascending or descending option is given in another, while two systems also allow a sort by publication and author.

Two systems allow users to limit search output to latest update, very useful for users who wish to run their own alerts. Limiting output to institutional holdings was not available in most systems. This would be a very useful feature with the potential to link to electronic full text within the library's holdings. Limiting by publication type was available in most systems as was limit to a specified date range.

A clean print format is available in all systems. This useful feature prevents the inclusion of browser tool bar clutter and other distracting, space-taking elements on printed citation pages. The inclusion of the search statement in the print format is also an extremely important feature, and was, surprisingly, not included in the print formats of all systems.

Whether a system has the facility to "save" or "download" records independently of the browser is another feature that greatly enhances end-user ease of use, and accommodates a broad range of user experience. Only one system allows the user to specify whether he is downloading for Windows or the Macintosh OS. All other systems simply default to the browser save options: text file or html.

Only one system facilitated emailing records as an attachment, with the option of different attachment-encoding methods. Most systems also included the search query within the body of the email.

FINAL NOTES

Online database functionality differs widely in the array of features offered. Pricing on systems also varies. To make an educated purchasing decision for your library or information center, it is essential to know what is available, how features and functionality streamline your work process, and what features may go beyond the needs of you and your user population. Match these functionalities with your database information needs and the size of your budget to make an informed decision when it is time to allocate those precious acquisition funds.

Luisa Sabin-Kildies (luisa@ei.org) is a product manager at Engineering Information Inc., Colleen Cool (ccooll@qc.edu) is professor of Library Studies at Queens College, City University of New York, and Hong (Iris) Xie (hirix@wuwm.edu) is professor of Library Studies at the University of Wisconsin—Milwaukee. Comments? Email letters to the editor to Marjorie@emission.com.
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