1.0 Introduction

Users of the Internet were initially impressed that they found useful information of any kind. However, now that anyone with access to a server and a passing knowledge of HTML (Hypertext Markup Language) can put information on the Internet, the problem has become one of sifting through a mass of advertising material and vanity publications in order to find information of high quality. Matthew Ciolek expressed a concern that the WWW (World Wide Web) may become the MMM (Multi-Media Mediocrity). [1]

For librarians and library users to make effective use of the Internet, they need criteria to use in evaluating the information found. As has been noted by James Rettig, many Internet sites that select and review Internet information resources rely on subjective values of style and "coolness," instead of focusing on information content. [2] This article will survey criteria that have been published on the Web and in the print literature and propose a set of criteria (a toolbox) that can be used by librarians and users to evaluate Internet information sources.

2.0 Why Evaluate?

Librarians may evaluate Internet information sources in order to:
(1) decide whether an Internet information source should be linked to a resource guide or library Web site, or (2) to judge the quality or appropriateness of information for a particular query or user.

The development of subject resource guides is seen as a logical role for librarians, extending to the online environment the traditional librarian's role of evaluating, selecting, and organizing published information. [3] Many libraries now maintain Web sites that have lists of Internet information resources. Without explicit criteria for selection of these sources, libraries risk wasting their users' time with tools of dubious value.

3.0 Evaluation Criteria for Print Materials

There exists a significant literature on the evaluation of print reference sources. Katz devotes a section of his influential textbook on reference work to "Evaluating Reference Sources," and lists as criteria purpose, authority, scope, audience, cost, and format. [4] Criteria for evaluating "traditional" material also appears on the Internet, as shown in guidelines published by Cornell University Library. [5]

Criteria for print materials can in most cases be applied to the Internet domain, but evaluation criteria may be more critical in
the "vanity publishing" environment of the Internet. Print publishing involves a series of editorial checks that tends to reduce the appearance of low-quality information. On the Internet, these checks exist to a lesser degree.

With the growth in concern about quality of Internet information, an increased number of publications in the print literature and on the Internet address the issue of criteria for evaluating Internet information resources.

4.0 Literature Review

In the last few years, a number of authors have considered criteria for the evaluation of Internet information sources. They generally take as their starting point criteria such as Katz’s for the evaluation of print reference tools, but Piontek and Garlock refer to the related area of collection development criteria. [6] Stoker and Cooke consider published criteria for evaluation of CD-ROM and online information services. [7]

While most authors agree that traditional criteria apply, there are particular aspects and concerns in the Internet environment that cause some new criteria to arise.

Authority is of particular concern. Collins states that the "first priority is to find trustworthy sources on the net." [8] Kovacs et al. see a role for librarians in assisting users to be critical of sources, seeing the key issues in an electronic environment as:

1. Don't believe everything you read.
2. Who is the author?
3. Is the source credible? [9]

A problem in evaluating authority on the Internet is to obtain information on scope and authority; in print sources, this may come from introductory notes. Kovacs et al. note a tendency for Internet resources not to offer useful scope notes or contain information about the credentials of the producers. Santa Vicca notes the "inconsistency of adequate descriptive information regarding the source of the retrieved information." [10] Tillman considers one of the key indicators of quality to be the ease of identifying the scope and criteria for inclusion; she then decides whether these factors match her needs. [11]

The lack of this kind of metainformation on the Internet also affects evaluation based on the criterion of purpose. Starr notes that it is often difficult to establish the purpose for which an Internet source was designed. [12]

In evaluating content, Piontek and Garlock make a distinction between sites that only provide links to other resources, and those that provide original information. [13] This is similar to Katz’s distinction between control-access-directional sources (e.g., bibliographies as well as indexing and abstracting services) and source-type works (like encyclopedias and factbooks). Both have their place, but Grassian argues that a
source should have an appropriate balance between inward-pointing links and outward-pointing links. [14]

Currency, in theory, should be where Internet sources have an advantage over print sources. However, several authors (e.g., Grassian) point out that it can be difficult to determine the date of update of Internet resources. [15] While many sites explicitly include a date of last revision, many do not.

The noncommercial nature of some information on the Internet can make for less current sources. Stoker and Cooke point out that Internet versions of common reference works are often the out-of-copyright older editions. [16]

The traditional criterion of format becomes more critical in the electronic environment when specialized software and hardware are required to access information. Many authors (e.g., Caywood) include a criterion of compatibility. This may include consideration of whether sites work with older browsers, such as Lynx, or use common multimedia formats. [17]

Considering ease of use of Internet resources introduces new criteria. Koopman and Hay coined the criteria "workability" to describe the ease of use of, and connection to, a service. [18] Gurn introduces a different but related criterion, "conviviality," for the ease with which a user interacts with a service. [19]

A particular aspect of the workability criterion is connectivity—whether, and how easily, one can connect to the site. Santa Vicca regards this as the most important criterion: "If one cannot access the information, one cannot evaluate the information." [20] Caywood makes connectivity a significant criteria, considering whether a site is frequently overloaded and whether the URL (Uniform Resource Locator) is stable. [21]

Cost is a criterion used for evaluating print resources; it has been given less emphasis in considering Internet resources due to the perception of the Internet as "free." Cassel considers the use of trial periods of fee-based resources as a way of evaluating whether they should be selected for linking from a library site. [22] Increasing concern with cost and the related issue of copyright lead Pratt et al. to include as one of a number of useful "Guidelines for Internet Resource Selection" a criterion of "cost and copyright." They highlight the need for ease of compliance with any restrictions on dissemination of information from the site. [23]

5.0 Reviewing and Rating Services

A key to resource selection in the print environment is the use of reviews. Unfortunately, as noted by Rettig, consistent, authoritative reviews of Internet information resources are not yet widely available. [24] Some publications which have a tradition of reviewing printed reference resources have started reviewing Internet sites; one example is "WebWatch" in Library Journal.

The Internet has seen a growth in the number of Web sites which
select, review, or provide awards for Internet information resources. (A number of these are listed, with URLs for their evaluative criteria, in Appendix A.) The criteria for some of the prominent Web review sites are primarily subjective and based on the concept of "coolness"—overall effect, rather than information content. For example, the publisher of Cool Site of the Day states, "Cool is nothing more than my opinion at the time of selection." [25] Magellan/McKinley has the criteria of "net appeal," asking "is it innovative . . . is it hot, hip or cool?" [26]

While ratings including "coolness" and similar criteria contribute to the vitality of the Web, they tend to omit consideration of issues of content and authority with which librarians are more concerned. Raters also tend to assume an absolute value for rating a site, while Rosenfeld, in satirizing these services, makes the point that the value of a resource will vary for different audiences and in different subject domains. [27]

On the other hand, there are sites, particularly those managed by librarians—for example, the Argus Clearinghouse—which tend to place more emphasis on content and authority. These are useful sources of external evaluation for Internet information resources.

6.0 A Toolbox of Criteria

This section attempts to amalgamate and assimilate criteria from publications listed in the references and other sources into a toolbox of criteria that can be applied by librarians selecting Internet information sources for a resource guide, or for a particular user or query.

Not all these criteria will be appropriate for all purposes, but the intention of a toolbox approach is that librarians and others selecting Internet resources can choose those criteria appropriate for their needs.

6.1 Scope

What items are included in the resource? Is the scope only implied, or is it stated through metainformation such as an introduction? Does the actual scope of the resource match expectations? Aspects of the scope include:

- Breadth: What aspects of the subject are covered? Is the resource focused on a narrow area or does it include related topics?
- Depth: What is the level of detail provided about the subject? This is related to the level of audience for which the resource has been designed, mentioned below.
- Time: Is the information in the resource limited to certain time periods?
- Format: A resource that provides links may restrict its scope to certain classes of resources. For example,
Telnet, Gopher, or FTP (File Transfer Protocol) resources may be excluded from a WWW-oriented site.

+ Page 10+

6.2 Content

Is the information fact or opinion? Does the site contain original information or simply links? Sites can be useful both as information resources in themselves and as links to other information. However, users can be frustrated by lists of resources which look promising, but turn out to simply contain more links.

Does the resource stand alone, or has it been abstracted from another source, perhaps losing meaning or links in the process?

Specific factors related to the content include the accuracy, authority, currency, and uniqueness of a resource.

6.2.1 Accuracy

Is the information in the resource accurate? A resource may be checked against other resources or against information that the evaluator has.

Are there political, ideological, or other biases? The Internet has become a prime marketing and advertising tool, and it is advisable to ask what motivation the author has for placing this information on the Net. Frequently, the answer is that the information is placed to advertise, or to support a particular point of view.

6.2.2 Authority

Does the resource have some reputable organization or expert behind it? Does the author have standing in the field? Are sources of information stated? Is the information verifiable? Can the author be contacted for clarification or to be informed of new information?

6.2.3 Currency

Is the resource updated or static? If it is updated, how frequently does this occur? Are dates of update stated, and do these correspond to the information in the resource? Does the organization or person hosting the resource appear to have a commitment to its ongoing maintenance and stability?

The date stamping of files, which can be determined by many browsers, indicates the date of change in the physical file; this may not reflect the currency of the information.

+ Page 11 +

6.2.4 Uniqueness

Is the content of the resource available in other forms (at other sites, on a Gopher, in print, on CD-ROM)? What advantages does this particular resource have? If the resource is derived from another format, does it have all the features of the original?
Have extra features been added? Does it complement another resource, for example, by providing updates to a printed source?

On the Internet, a resource may be available from a number of different sources. For example, the World Fact Book is available widely at various locations, in different editions, and in FTP, Gopher, and HTML formats. This kind of redundancy may be valuable—a particular site may not be available when required, and an alternative or mirror site may have to be used. Some users may not be able to access certain types of resources, for example Telnet or image-based Web sites, so the availability of alternative formats may be useful.

6.2.5 Links Made to Other Resources

If the value of the site lies in its links to other resources, are the links kept up to date, and made to appropriate resources? Are the links made in such a way that it is clear that an external site is being referred to? There are potential copyright issues with sites that, for instance, enclose an external link in frames so that the source of the information is unclear.

6.2.6 Quality of Writing

Is the text well written? While hypertext linking and multimedia are important elements of the Web, the bulk of the information content on the Web still lies in text, and quality of writing is important for the content to be communicated clearly.

6.3 Graphic and Multimedia Design

Is the resource interesting to look at? Do the visual effects enhance the resource, distract from the content, or substitute for content? If audio, video, virtual reality modeling, or other effects are used, are they appropriate to the purpose of the source?

A related criterion is navigational design, mentioned below in the context of browsability and organization.

6.4 Purpose and Audience

What is the purpose of the resource? Is it clearly stated? Does the resource fulfill the stated purpose? The purpose needs to fit the intended audience for the resource.

Who are the intended users of this resource? At what level is the resource pitched: toward a subject expert, a layperson, or a student? Will the resource satisfy the needs of the intended users? Does the user group at which the site is aimed have the connectivity to access the resource?

6.5 Reviews

What do reviewing services say about the site? The use of reviewing journals has been a mainstay of the development of printed collections; librarians in the Internet environment will need to become familiar with the strengths and weaknesses of the
tools reviewing Internet resources.

6.6 Workability

Is the resource convenient, and can it be used effectively? This is the area where criteria for Internet resources differ most from print sources.

An issue in providing access to electronic documents is whether a library should provide links to the originating site or "acquire" the publication for local access. Poor workability may indicate that the library should store the data locally, if intellectual property considerations allow this.

Aspects of workability fall into a variety of areas.

6.6.1 User Friendliness

Is the resource easy to use? Are any necessary special commands clear? Is help information available? Have user interface issues been addressed, such as menu design and readability of screens?

6.6.2 Required Computing Environment

Can the resource be accessed with standard equipment and software, or are there special software, password, or network requirements?

Has the resource been designed to work well with one software and user interface (for example, the latest Netscape release on a T1 connection)? Is it difficult to use with others (for example, Lynx at 2400 bits per second)? It is useful to test resources with a variety of browsers and connections. Telnet resources may pose problems to users who have not installed a Telnet client. Images and other multimedia may create problems if users have not installed the correct helper application.

While the extent to which older browsers are currently used is a source of argument, there are still Lynx-only, frames-challenged, and visually impaired users, and sites should attempt to meet their needs. This criterion is less important where users are in a defined computing environment, such as that provided by workstations in a particular library.

6.6.3 Searching

How effectively can information be retrieved from the resource? Is a useful search engine provided? What operators and ranking features are available? Is use of the search engine interface intuitive? Does the search engine index the whole resource?

6.6.4 Browsability and Organization

Is the resource organized in a logical manner to facilitate the location of information? Is the organizational scheme appropriate (e.g., chronological for a historical source or geographical for a regional resource)?
6.6.5 Interactivity

Where interactive features such as forms and CGI (Common Gateway Interface) scripts are provided, do they work? Do they add value to the site?

6.6.6 Connectivity

Can the resource be accessed reliably, or is it frequently overloaded or offline? Is the connection one of limited bandwidth, so that pages take a long time to load or keystrokes a long time to echo? Is a local mirror site available, or do international traffic charges have to be incurred?

+ Page 14 +

6.7 Cost

Currently, Internet information resources are perceived as being free. However, costs do exist, and they are likely to become more important. Costs can be divided into: (1) costs of connecting to the resource, and (2) costs associated with the use of the intellectual property contained in the resource.

Internet users paying traffic charges already have to consider the costs of connection, and they may want include this in criteria for selection. For example, they may favor text-based rather than image-intensive sites, if the information content is the same.

Increasingly, there will be sites where a charge is made for the intellectual content of the site. Libraries have been dealing with pay-per-use online services such as Dialog for many years, but the Internet has created an opportunity to make services available to end users for a fee. Libraries have a role in negotiating subscriptions and site licenses for organizational access to services that charge.

If online transactions are used to pay for information, the security of these transactions at a site may become important. Services that have a version that costs money may be available with limited functionality, for trial periods, or for free. Librarians will need to decide whether to provide the enhanced or the limited version.

7.0 Criteria Used by Internet Evaluation Sites

It has been mentioned that a number of resources on the Internet evaluate sites for selection, review, or rating. To gain an indication of which criteria may be seen as most popular, in March 1997, the toolbox criteria were compared with criteria listed at ten sites that selected, reviewed, or rated Internet information sources. Notes about these sites are included as an appendix.

+ Page 15 +

The comparison is presented as Table 1. Toolbox criteria are listed on the left, and an asterisk (*) indicates that this criterion was mentioned by the site.
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+ Page 16 +

Sites:

1. Best of 1996 Social Sciences, Humanities & Asian-Pacific Studies WWW Resources
2. The Argus Clearinghouse
3. CyberHound
4. CyberStacks
5. Infofilter
6. The Internet Public Library
7. Magellan Internet Guide
8. Sitegrade
9. Stevie's WWW Ratings
10. Criteria Used to Select Links for Resources' Catalogues: a Collaborative Gathering of Thoughts and Ideas

This gives an indication of the kind of criteria that selectors, reviewers, and rating services feel to be important. When criteria from the toolbox are listed in order of the frequency
with which the evaluating sites mentioned them, the result is the listing found in Table 2.

Table 2. Frequency of Appearance of Toolbox Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Number of Sites</th>
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<tr>
<td>Graphic and multimedia design</td>
<td>10</td>
</tr>
<tr>
<td>Browsability and organization</td>
<td>8</td>
</tr>
<tr>
<td>Currency</td>
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<tr>
<td>Content (in general)</td>
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<td>Uniqueness</td>
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<td>Audience</td>
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<tr>
<td>Workability (in general)</td>
<td>4</td>
</tr>
<tr>
<td>Connectivity</td>
<td>4</td>
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</tbody>
</table>

This indicates that appearance is widely regarded as important, even among sites that are primarily concerned with content. The organization of the site and ease with which users can find their way around are also seen as important in the Internet environment. All evaluation sites included some aspect of content and workability. The traditional reference librarian's criteria of currency, authority, and audience are also widely used.

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Obviously, this brief survey is only indicative. A more detailed attempt to establish and consolidate quality criteria for the Internet by using a Delphi study is under way at the University of Georgia. [28]

8.0 Conclusion

This article has reviewed the use of criteria for evaluating Internet information sources and proposed a toolbox of criteria for this purpose. Librarians and others working with Internet information resources should create and use lists of criteria appropriate to their users and subject areas and make these explicit in the resource guides that they create.

A comparison of criteria stated in a sample of evaluation sites on the Internet shows that, while graphic design is important, browsability and organization are widely used criteria along with more "traditional" criteria such as currency, authority, and audience.

There is scope for future research on evaluation criteria to establish attributes that users regard as important in Internet information sources. This knowledge would assist developers of Web sites and librarians who are evaluating Internet information sources.

Notes

1. T. Matthew Ciolek, "Today's WWW--Tomorrow's MMM? The Specter


15. Ibid.


20. Santa Vicca, "The Internet as a Reference and Research Tool," 225-236.


26. The McKinley Group, How Does Magellan Rate Sites? ([Accessed March 1997].) See <URL=http://www.mckinley.com/feature.cgi?faq_bd#howdoes>. Note: this site is no longer current. It is an illustration of the ephemeral nature of the Web that Magellan no longer offers explicit criteria for selection; however, their original criteria are currently preserved by the University of Alabama Libraries at <URL=http://www.lib.ua.edu/maghelp.htm#howdoes>.


Appendix A. Evaluation Sites

1.0 The Argus Clearinghouse

<URL:http://www.clearinghouse.net/>

The Clearinghouse provides clearly laid out criteria that are used for evaluating the resource guides it includes. The criteria are based on level of resource description, level of resource evaluation, design, organizational schemes, and metainformation. These are useful criteria for evaluation of resources, although they are specifically intended for the evaluation of resource guides. The criteria are listed at <URL:http://www.clearinghouse.net/ratings.html>.

2.0 Best of 1996 Social Sciences, Humanities & Asian-Pacific Studies WWW Resources

<URL:http://coombs.anu.edu.au/SpecialProj/QLTY/BEST/Method96.html>

This is an example of a "best of" competition, but with an academic bent. Entries are to be rated under the criteria of quality, structure, and presentation. Brief definitions of these criteria are listed under "Rating Procedure."

3.0 CyberHound

<URL:http://www.thomson.com/cyberhound>

Cyberhound is a service of Gale Research, well known for their print reference works. In addition to being a search and directory service, Cyberhound offers reviews according to criteria under the headings content, design, technical merit, and entertainment. The criteria are found at <URL:http://www.thomson.com/cyberhound/frames/content.html#rating>.

4.0 CyberStacks

<URL:http://www.public.iastate.edu/~CYBERSTACKS/>

This experimental site arranges selected Internet information resources in science and technology by Library of Congress classification. Its criteria (authority, accuracy, clarity, uniqueness, recency, reviews, and community needs) are stated to be the same as those laid down for conventional resources in the American Library Association's Reference Collection Development: a Manual, published in 1992. This does not address issues such as workability which are more specific to Internet information resources. CyberStacks' criteria are at <URL:http://www.public.iastate.edu/~CYBERSTACKS/signif.htm>.

5.0 Infofilter

<URL:http://www.usc.edu/users/help/flick/Infofilter/>
As of July 1997, this project has ceased operation. It lists criteria of authority, content, organization, currency, search engine, graphic design, and innovative use of the medium. The criteria are listed at <URL:http://www.usc.edu/users/help/flick/Infofilter/template.html> under "Review."

6.0 The Internet Public Library

<URL:http://www.ipl.org/>

The IPL states that its collection policy for selecting ready reference resources is based on content, updating, the graphics being complementary rather than distracting, availability of text interfaces, evidence of proofreading, and whether the document is a primary one. The selection policy is at <URL:http://www.ipl.org/ref/RR/Rabt.html#policy>.

7.0 Magellan Internet Guide

<URL:http://www.mckinley.com/>

For ratings in the Magellan directory, McKinley Group uses the criteria of depth, ease of exploration, and net appeal. The latter is assessed by asking, "Is it innovative? Does it appeal to the eye or the ear? Is it funny? Is it hot, hip, or cool? Is it thought-provoking?" The ratings explanation is reproduced at <URL:http://www.lib.ua.edu/maghelp.htm#howdoes>.

8.0 SiteGrade

<URL:http://www.sitegrade.com/>

This site assigns "letter grades to websites in order to encourage responsible use of the World Wide Web medium so that the widest possible audience can enjoy it." Fairly detailed criteria are stated at <URL:http://www.sitegrade.com/criteria/>.

9.0 Stevie's Web Site Ratings

<URL:http://www.steview.com/cgi-bin/STEVIE/rat_home>

This is quite a complex voting system. Users can rate a site on access speed, applicability to different age groups, ease of navigation, educational/informative quality, entertainment quality, appearance, timeliness, and usefulness. Ratings are continually averaged, and the latest figures and top ten sites are available from the Web site.

10.0 World Wide Web Virtual Library Maintainers: Criteria Used to Select Links for Resources' Catalogues

In 1995 an email poll of WWWVL site maintainers was used to accumulate a range of criteria used by the maintainers in selecting material for their sites. This provides a wide range of criteria, available at <URL:http://www.ciolek.com/WWWVLPages/QltyPages/QltyLinks.html>.

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The author maintains a page, which is part of the World Wide Web Virtual Library, with links to a number of resources relating to evaluation criteria for Internet information resources. See <URL:http://www.vuw.ac.nz/~agsmith/evaln/evaln.htm>.

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