Internet’s Potential as a Global Information Infrastructure: A Case Study and Assessment

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Few would argue that the Internet is a global information resource for academicians and researchers. This article asks whether Internet has the potential to become a global information infrastructure for broad-based user communities. This question is answered using the case study method. The authors searched for the same information using two Internet directories (the List of Libraries and the List of Lists), four Internet interface services (Archie, Gopher, Wide Area Information Service, and World Wide Web), and two commercial services (Dialog and ABI/Inform). The case study evidence indicates that the Internet information resource is not likely to become an information infrastructure based on the criteria of being shareable among all classes of users, having a common interface, being enabling of development, scalable and economically sustainable. The authors recommend radical changes to the current Internet organization and propose six major agenda items.

This article assesses Internet’s potential to evolve into a global information infrastructure. Internet now connects over 7 million users through 1.49 million Internet host computers in 2,000 separate networks in 45 countries (Malamud, 1993; Lottor, 1993). Many kinds of information resources are available to users worldwide through three basic functions. Messages, interest lists, and some electronic journals are available through e-mail (electronic mail). Library catalogs, bibliographic databases, and access to remote host computers are available through Telnet (terminal emulation). Computer software and text documents are available for transfer between Internet host computers through FTP (file transfer protocol). Special purpose interfaces, such as Archie, Gopher, Wide Area Information Service (WAIS) and World Wide Web (WWW), enable access, search and retrieval of global information resources. However, there is a significant difference between a global information resource and a global information infrastructure.

An infrastructure is a shareable, common, enabling, enduring resource that has scale in its design, is sustainable by an existing market, and is the physical embodiment of an underlying architecture (McGarty, 1993, pp. 221, 222). These elements are defined as follows:

Shareable: The resource must be able to be used by any set of users in any context consistent with its overall goals.

Common: The resource must present a common and consistent interface to all users, accessible by a standard means. Thus common may become synonymous with the term standard.

Enabling: The resource must provide the basis for any user or set of users to create, develop, and implement any applications, utilities or services consistent with its goals.

Scale: The resource can add any number of users or uses and can by its very nature expand in a structured manner to ensure consistent levels of service.

Economically sustainable: The resource must have economic viability. It must meet the needs of both customers and providers of information products. It must provide for all elements of a distribution channel bringing the product from the point of creation to the point of consumption.

Note that this definition includes the condition, con-
sistent with its overall goals. We envision Internet’s overall goals to be the provision of information networking services to broad-based user communities. This vision extends Internet’s original mandate of serving only academic and research communities (Krol, 1992).

The potential benefits of Internet’s becoming a global information infrastructure include enriching the quality of education and the quality of life. For example, distance education through Internet could free students and professors from the time and space constraints of classroom meetings. Sick children and at-risk populations could learn from their homes or hospitals. College students could perform research, broaden their horizons and widen their friendships through bibliographic databases, e-mail and interest lists. College professors in fields other than computer science could perform online research and collaborate with colleagues worldwide using bibliographic databases, e-mail and interest lists. Schoolteachers could collaborate about curricula. Schoolchildren could acquire skills needed for the Information Age as they learn about other cultures through international e-mail pen pals and use global library resources. Public libraries could become less dependent upon paper documents and could direct their resources toward electronic information access. Residential users could participate in e-mail, interest lists, distance education, entertainment and various types of business transactions.

A global information infrastructure has the potential to reduce the disparity between the information rich and the information poor, between the more and the less developed areas of the world, and between large and small organizations. For example, remote areas of the globe could have fast access to expertise in critical areas such as medical diagnosis. Researchers, professors and students in less developed areas could have timely access to interest lists and scholarly journals, contributing to their rate of scholarly and technological progress. Entrepreneurs, as well as small and medium-sized businesses could have the same communications networking functionality as large companies, exchanging information with their branches, banks, customers and suppliers worldwide (Klingenstein, 1993).

These examples illustrate some benefits to be derived by new user communities from a global information infrastructure. To assess Internet’s potential to provide that infrastructure, we must begin with a realistic assessment of its present capabilities. This assessment will be demonstrated through the case study research method. The research is based on the proposition that the Internet must present a common interface if it is to be shareable by all potential user communities. The article includes the following sections: case study, assessment, recommendations, and conclusions.

Case Study

This case study documents our experience searching the Internet for information on the subject artificial intelligence. The case is presented in three sections. The first section describes our search using two Internet resource guides, the hardcopy List of Libraries and the online List of Lists. The second section illustrates our search using four non-commercial Internet interface services: Archie, Gopher/Veronica, Wide Area Information Service (WAIS) and World Wide Web (WWW). For comparison, the same search is performed using two commercial information services, Dialog and ABI Inform. The third section evaluates the existing interfaces and derives features of an ideal interface.

Internet Resource Guides and Directories

Learning about the online Internet resources is difficult because one must first know what and where they are (Krol, 1992, p. 325). After obtaining the hard copy List of Libraries, (about six inches thick) we noted that it is organized alphabetically by library name, not by subject. Next to each library name is the page number in the guide containing Telnet instructions for logging into the library’s online catalog. We were faced with the prospect of accessing individually each of the hundreds of library catalogs throughout the world until we found those with collections on artificial intelligence! The situation was the same for other Internet resource guides. The user must browse many unnecessary sites to find a site with the subject of interest.

Figure 1 contrasts the expected and the actual search sequence using Internet guides. As shown in Figure 1a, we expected to browse a guide by subject, in this case, artificial intelligence. Then, we expected to select a resource, such as libraries with holdings on artificial intelligence, and have the interface connect automatically to the site. Once connected, we expected to browse the catalog for relevant information, retrieve the information if relevant, exit the remote site, and continue browsing by the same subject and resource type (library catalog) until we wished to change the resource type (e.g., from library catalogs to electronic journals). Instead, as illustrated in Figure 1b, one has to reference a different guide for each resource, making many unnecessary connections until one finds a site containing the subject of interest.

The online guides have the advantage of keyword search. Keyword search is useful for finding resources that contain the subject of interest in their title or description. For example, after retrieving the List of (Interest) Lists, the keyword artificial intelligence revealed the names of several interest lists and their descriptions that contained the keyword search term. A better interface to the List of Lists would allow the user to subscribe automatically once an interesting list is found, rather than having to exit and e-mail a subscription request.

These cases illustrate that finding information using Internet guides is labor-intensive and time-consuming. After libraries and interest lists the same process would have to be repeated for guides to electronic journals, FTP (file transfer protocol) documents, and online bibliographic databases.

Interface Services