

Building web-based scholarly communication forums using electronic journals

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Abstract

Scholarly communication is the root of scientific progress. Research on how to improve the efficiency and effectiveness of the scholarly communication system is being carried out worldwide, particularly with respect to electronic journals which can and should be constructed as communication forums. Refereeing new contributions for these forums is a major means for their quality control and for the acceptance of the new media. We have implemented a web-based electronic refereeing system for an electronic journal (RIS - Review of Information Science) whose many value-added features are described in detail. Faster communication and enhanced interactivity between referees, editors and authors will be achieved by the use of this Web based electronic refereeing system. In order to ease access and browsing, articles already published will be integrated and managed in a database-based open hypertext system, in this case in KHS (Konstanz hypertext system). Finally, we describe the advantage of a real time communication system for authors, referees, editors and the domain-specific public. Further research will focus at improving the communicative features of this preliminary web-based communication forum and at evaluating it from a user point of view.

Keywords: scholarly communication, scholarly journal, electronic journal, peer review, communication forum, open hypertext system

In 1991, Joshua Lederberg, the 1958 Nobel Prize recipient for his work on the foundations of bacterial genetics, made a speech entitled "Communication as the root of scientific progress" [1], which was later published in the journal "Scientist". In his speech, Lederberg indicated the significance of scholarly publishing, scholarly literature and scholarly communication for the progress of science.

Nowadays, science and technology are rapidly developing, and it has become more and more obvious that the development of science and technology will, to some extent, depend on the efficiency of the scholarly communication system. Meanwhile, many countries are engaged in constructing the National Information Infrastructure which, as a technological basis, will facilitate scholarly communication as well. As a result of the rapid development of science and technology, the publishing industry will, on one hand, play a more important role in the development of science and technology. On the other hand, although more and more new technologies are available, it is facing various problems such as time delay, high cost, self-publishing by authors, etc. Therefore, research on how to improve the efficiency and effectiveness of the scholarly communication system is being carried out worldwide, and research fields such as digital library and electronic journal are attracting much interest.

As one of the most important forms of scholarly communication, scholarly journals are also undergoing a process of change, and just like Giussani's observation on electronic newspapers - "the newspaper is no longer a product. It becomes a place. A place where people from the community stop by, make contacts and come back again to build a common future" [2] -, electronic journals can and should be constructed as communication forums where scholars can publish their papers, browse, search for or exchange information and discuss various issues.

Participants and communication channels are the two elementary components for a communication forum. Moreover, an efficient, subject-specific communication forum can be formed by maintaining a formal communication channel (e.g. a publishing process) and providing some other communication channels, including direct communication. Among all the different communication channels, the formal channel will form the basis of the whole communication forum: it will provide "seeds" to arouse discussions. In this

text, we will address various issues related to electronic literature, from its production to its efficient usage, with the emphasis on electronic journal. The discussion will be focused on how to build an electronic scholarly communication forum.

1. Design and implementation of a new refereeing/production system

Scholarly literature is an essential element of the scholarly communication system. As Lederberg pointed out, scholarly literature is both an archive and an open forum: a literal, archived forum [1]. It is the formal form and the basis of scientific communication. This formal publishing channel will still exist in the electronic age, because [3]:

- it is very important for literature to be accessed, achieved, read or used. Usually, informal communication or publishing channels can not provide this warrant to readers; and
- there must be a quality control for publishing.

Here we will primarily discuss the issue of implementing a new refereeing system, since the refereeing process has been serving as the most important measurement of quality control. However, on the other hand, refereeing systems in traditional publishing systems, especially refereeing systems of journal publishing, are facing a crisis: the serious time delay, as pointed out by Dalton: "... in the print world intervals of years may pass between the initial submission of a paper and its publication" [4]. Obviously, it is necessary to implement a new, electronic form of refereeing. Furthermore, the implementation of an electronic refereeing system will also be very interesting for the entire traditional publication industry: for scholarly journal publishing, for book publishing, and for other forms of publishing as well. From a technical point of view, some emerging technologies, such as the World Wide Web, allow the realization of such a new system: the time delay problem in the refereeing process is expected to be solved electronically, and communication and interaction between authors, editors and referees are expected to be enhanced as well.

In Konstanz we have implemented a web-based electronic refereeing system for an electronic journal [5], which can be used for book and other literature publishing as well. This web-based electronic refereeing system provides the following functions:

- data management and displaying: There are a lot of various data related to the refereeing process,

such as information about referees, information about authors, e-mail exchanges between the editorial board and authors, schedule, etc. All data are archived and can be displayed, statistics can be drawn in real time, all e-mails are managed by the shareware program Hypermail and can be viewed again if desired.

- Support tasks / sub-processes of the refereeing process:
 - ◆ Call for papers: The following functions are implemented for this process: (1) Sending requests to authors or listservs, and (2) data management. Authors or listservs and newsgroups, to which a request ("Call for Papers") will be sent, can be selected from the archive data (a list). Requests, which have been sent out, are archived and can be selected as well. All data will be archived and can then be reused;
 - ◆ Receipt of submissions: After a submission is received, an announcement can be sent to the author(s) via e-mail to confirm the receipt of the submission;
 - ◆ Selection of referees: The selection of referees is supported. The announcements to the selected referees will be sent by e-mail. Two further functions are also implemented, i.e., while referees are to be selected, (1) a statistical table of current referees' tasks can be displayed as reference; (2) referees can be automatically selected and recommended according to the match between their profiles and the subject of the article;
 - ◆ Announce an article into the open refereeing process: Open refereeing means here that an article can be refereed by whomever willing to review it. The following functions are supported: Sending the announcement to all referees informing that an article is in the open refereeing process; the articles in open refereeing process can be checked and be changed back to an "unrefereed" article at any time, as long as they haven't yet been refereed, i.e. there is a control mechanism for the open refereeing process in order to avoid that articles become "lost" in the open refereeing process if none wishes to review them;
 - ◆ Revision of articles: Articles often need to be revised for publication. Articles are divided into 3 status during the revision

process: to be revised, being revised, and revised. Editors can send announcements to authors for revision;

- ◆ Decision making by the editor-in-chief: The Editor-in-chief can view the status and other information about an article and then make his/her decision, he/she can also change his/her decision;
- ◆ View articles and write assessments: A standard assessment formula is available for the evaluation of an article by referees. Referees can view the

articles on the Web, write their assessments and send the assessment to the editor board by e-mail.

other functions, such as providing communication means for the editor board, access control mechanism for the whole data and processes, etc.

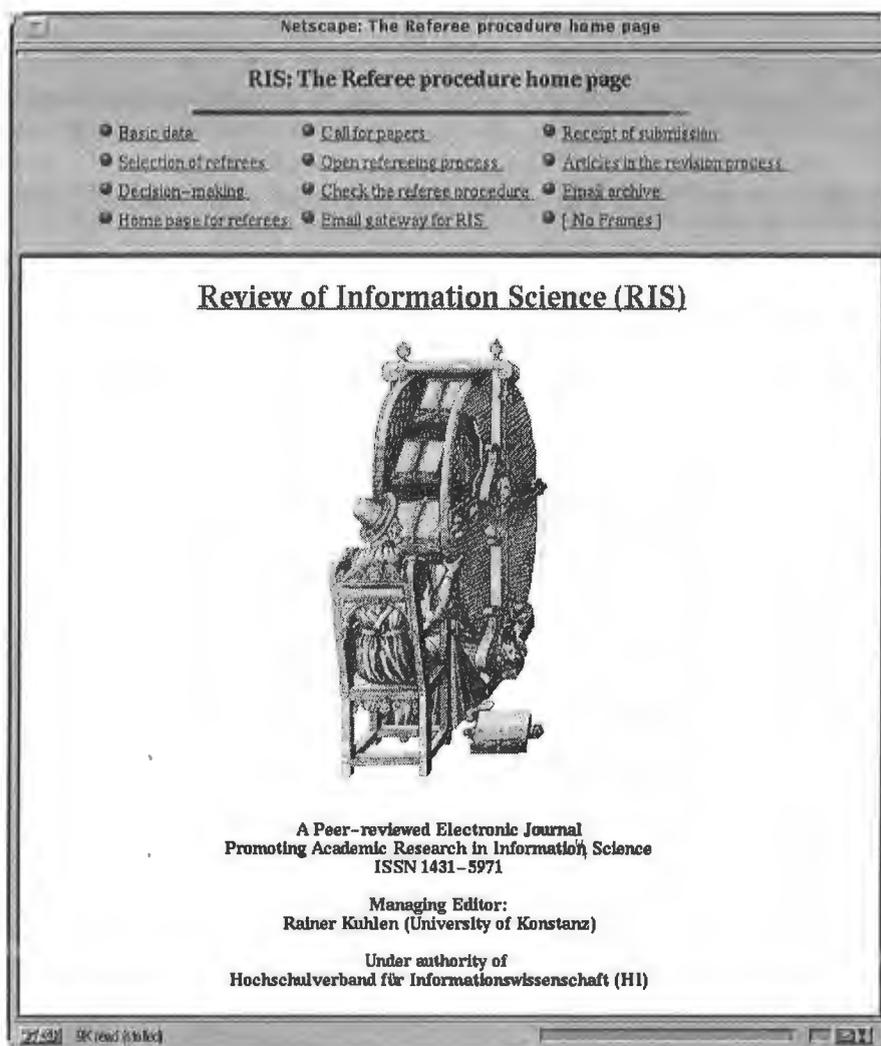


Fig 1. The referee procedure home page of the electronic journal RIS

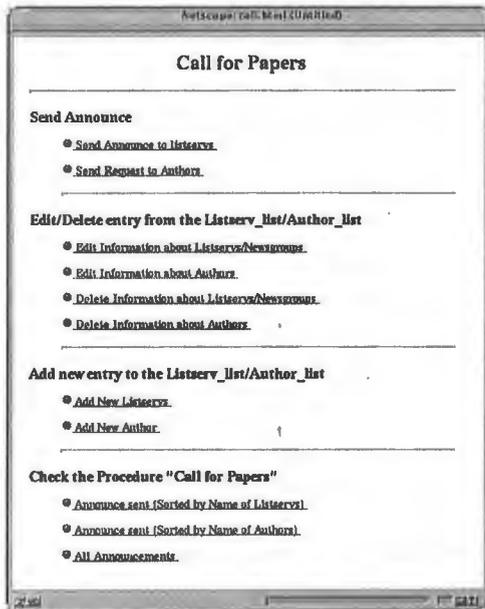


Fig 2. Call of papers

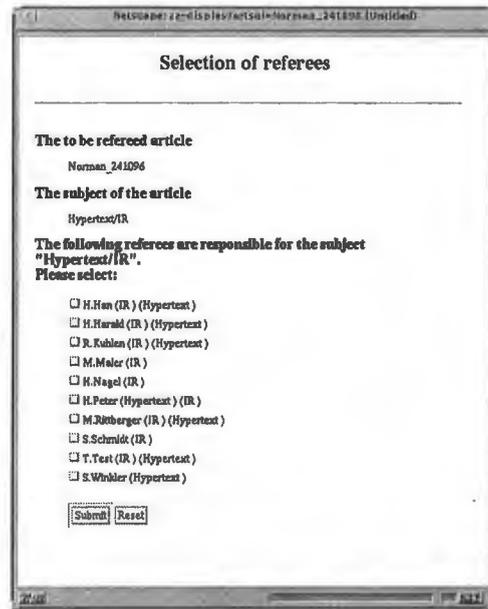


Fig 3. Select referees

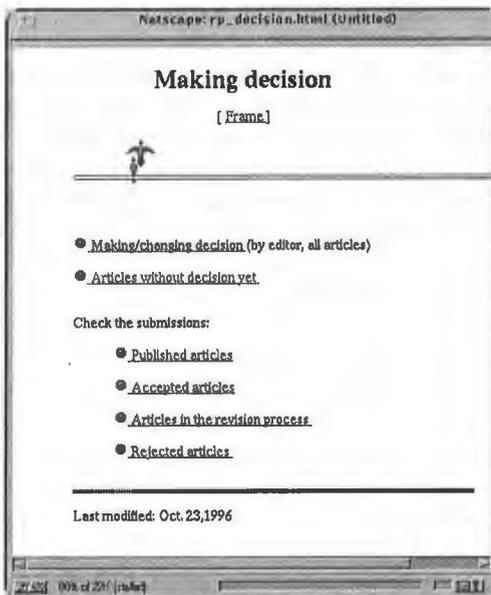


Fig 4. Make decision by chef-editor

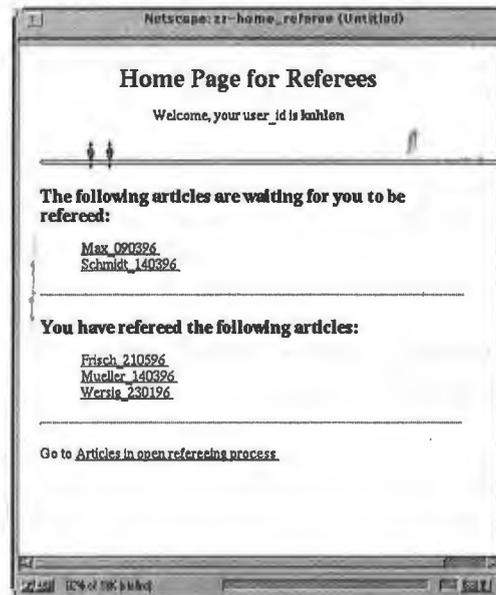


Fig 5. Home page for referees

Compared to the traditional refereeing system, the new system incorporates many value-added features as described below:

- it enables a more efficient flow of precise information in the refereeing process: All management data can be archived and are available at any time. Exact analysis can be done easily, statistics can also be collected automatically, all e-mails are archived in mailboxes and are managed by the program "Hypermail";
- it can provide multiple supports for the controlling of the refereeing process in a more flexible way: The sub-processes can be controlled and managed individually;
- it can support decision-making, for example, in the sub-process "selection of referees", referees can be displayed based on their subject fields and task loads, this measurement not only helps the editor-in-chief make decisions easily, but improves the efficiency of the entire refereeing process.

- it can enhance the communication between authors, editors and referees due to the more effective data management and e-mail utilities (which are also web based);
- a user-friendly interface is realized by the Web based implementation. In addition, no additional client software besides a Web browser will be needed;
- the refereeing process can be expected to be carried out more quickly by using e-mails as the means of communication and by the implementation of a function to automatically check the refereeing process and a function to remind the referees..
- flexible "home working" has been realized: No matter where the editors or referees are, they can do their work as long as they have access to the WWW. Time and geographical limits are thus eliminated.

In general, it can be expected that a more efficient, faster communication and enhanced interactivity between referees, editors and authors will be achieved by the use of this Web based electronic refereeing system. The time delay problem can then be expected to be solved by the introduction of this system, as well.

Moreover, this web-based refereeing system can be extended to a refereeing/production system by combining it with some other tools, such as HTML editors, uploading functions, file management tools, etc.

2. Archiving and managing published electronic literature

A key issue for scholarly communication, after the publication process, is how to maintain and prompt a forum based on electronic literature. The fundament here is how to archive and preserve this electronic literature and how to make it be efficiently utilized. An essential point for web-based publishing is that readers should be allowed to have unending access to articles published. This requires a proper archiving mechanism. In Konstanz, we have discussed the possibility that the university library take care of this. The published articles will be sent to the library both in print and in electronic form. The library will be in charge of managing the literature and providing query / delivery service.

The central point here is how we can preserve and manage electronic resources, which are in various new forms, such as electronic books, electronic journals, etc., to achieve the longevity of the information published. For this, the cooperation

between publishers and libraries, particularly digital libraries, is highly needed.

As an effective solution, articles published in electronic journals can be integrated and managed in an open hypertext system, especially in a database-based open hypertext system: in an open hypertext system, all information saved are flexible and can be easily made available on the Web, and many value-added features of the open hypertext system would then be available for electronic journals. In addition, information in an open hypertext system can be converted into other forms relatively easily. In this way, the problem of "the potential obsolescence of the data format employed" [6] can be avoided.

3. Providing new communication channels

As mentioned above, while the formal channel (publishing) builds a basis for the communication forum, direct communication will allow a sufficient information exchange. With the combination of all those channels, a highly efficient communication forum can be built. On the other hand, the electronic character of the new publishing form makes it also possible for new forms of communication forums to be built. There are already numerous software packages which support direct communication among a lot of people, either in real time mode or other modes. In general, those software packages can be divided into three categories [7]:

- web conferencing software;
- web-based real time communication software, such as Java chat Applets; and
- other real time communication tools, such as voice-based teleconferencing, video conferencing.

In order to meet scholars' various information needs, both channels supporting real time communication and channels which can be built by web conferencing software will be desirable. Many features of software packages of the 3rd category, such as MBONE, are desired for building communication forums as well. However, we will only concentrate on web-based solutions.

We employed the web conferencing software "Hypermall" to build a web form of an e-mail-based discussion forum. This type of channel has some advantages over most real communication channels such as "chat room": Information exchanged can easily be archived, managed, or further processed (such as integrated in a database

system). In addition, to some extent, it can be seen as a formal communication.

Readers may need a real time communication channel, which is more flexible, informal, and quick to respond. We have realized this by employing a Java Applet. Beside its basic function - allowing

real time chatting, the Java Applet employed provides a group function, that is, different "chatting rooms", which can be built for different purposes. For an electronic journal we have built two chatting rooms: one room for ordinary readers and the other for the editorial board (Fig 6).



Fig 6. Real time communication channel

4. Further work

With the combination of the publishing channel and the affiliated communication channels, we have built a preliminary web-based communication forum. However, in our opinion, a perfect scholarly communication forum should allow participants - besides to get access to literature published in the electronic journal - to:

- take part in discussions by sending posts;
- create/open new discussion threads;
- read or look at background and history information about the discussions;
- get further information related to topics (being) discussed.

Therefore, many BBS features, including volunteer "board master", summarizing the discussions, etc., will be valuable for a web-based

forum. Currently, we are working on an open hypertext system/database-based solution. With the help of integration in an open hypertext system/database, all features of open hypertext systems/databases will be available for the construction of communication forums and all information will be more flexible and more easily accessible. Our current research is being carried out on the basis of a refereed electronic journal, the "RIS - Review of Information Science" published in Konstanz (URL: <http://www.inf-wiss.uni-konstanz.de/RIS/>), and of an open hypertext system, the Konstanzer-Hypertext-System (KHS) [8]. In our research; articles of RIS have been split into hypertext units and saved in a KHS hypertext. By means of modifying some parameters or methods in the KHS, articles in HTML format can be generated in desired layout. The two figures below show (1) a section of an article generated by the KHS and (2) a RIS forum constructed by using of the KHS.

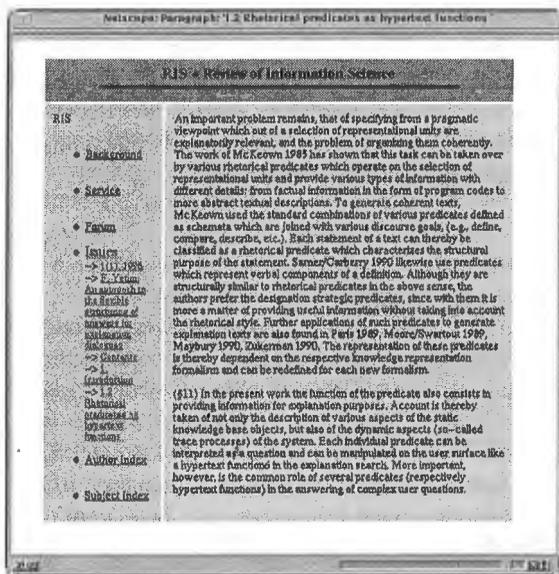


Fig. 7 A section of an article generated by the KHS

Having set up an experimental version of a communication forum, there is a need for evaluating the system in real-world application. This will be provided by the above mentioned Konstanz electronic journal RIS which will gradually expand into a real scholarly communication forum.

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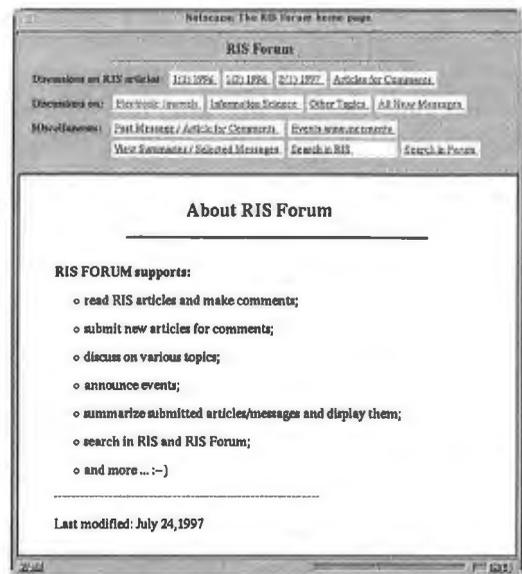


Fig. 8 The RIS forum constructed by using of the KHS

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