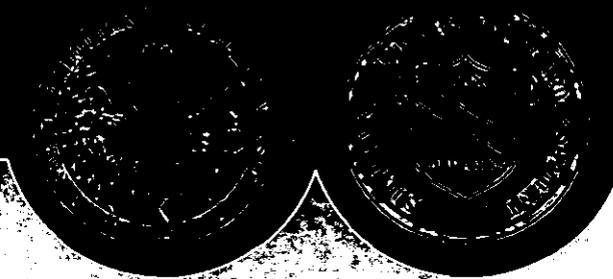


THE INSTITUTE  
OF STATISTICS

UNIVERSITY OF NORTH CAROLINA STATE



STARTING A NEW JOURNAL IN STATISTICS EDUCATION

Daniel L. Solomon  
J. Tim Arnold  
E. Jacquelin Dietz

Institute of Statistics Mimeo Series #2241  
January 1993

NORTH CAROLINA STATE UNIVERSITY  
Raleigh, North Carolina

D.L. Solomon, J.T. Arnold  
E.J. Dietz  
MIMEO SERIES STARTING A NEW JOURNAL  
2241 IN STATISTICS EDUCATION

NAME	DATE

The Library of the Department of Statistics  
North Carolina State University

# Starting a New Journal in Statistics Education<sup>1</sup>

Daniel L. Solomon, J. Tim Arnold, & E. Jacquelin Dietz  
Department of Statistics  
North Carolina State University

## Introduction

The goal of this presentation is to report on the process by which we are establishing a new electronic journal. The oral presentation will emphasize the content, editorial, administrative and policy issues, although this written version includes expanded material on technical matters as its final sections. I hope that you will not find this emphasis inconsistent with the theme of this symposium, but in fact a primary message is that in establishing even an electronic journal, the scholarly issues should dominate the technical. If our journal succeeds, this report will also bear testament to the power of naiveté.

## Background

The story begins in the Fall of 1991 when our faculty were involved in a strategic planning effort partly motivated by a state budget crisis that prompted us to reevaluate our priorities. Trying to make the experience a positive one, we couched our goal as the formulation of "Grand Initiatives" that would carry the department into the twenty-first century.

The Department of Statistics at North Carolina State University (NCSU) is one of the oldest and largest in the United States, with a long-standing commitment to statistics education. The department has been innovative in bringing technology into the curriculum; our Statistics Instructional Computing Laboratory is a state-of-the-art facility with a full-time director. Because the department was established early in the history of academic statistics, most of the statistics teaching on the campus is done by our faculty. This is not the case in many other colleges and universities. In addition to the teaching of statistics for students from other disciplines, we have large undergraduate and graduate degree programs of our own. Thus, it was not surprising that one of the initiatives proposed in our planning exercise was in statistics education. We felt that no U.S. university had a "claim" on statistics education as a special strength, and that the niche begged to be filled.

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<sup>1</sup>Presented by Daniel L. Solomon at the symposium "Scholarly Publishing on the Electronic Networks," December 7, 1992.

## Motivation

A working group developed a full menu of projects that might be included in such an initiative. One of these was a new journal devoted to statistics education. The proposal was to establish a rigorously-refereed journal on postsecondary statistics education, one that authors would view as a desirable place in which to publish and readers would consider a valuable resource. At present, there are few prestigious places to publish on the teaching of statistics, particularly at the college or university level. The British journal *Teaching Statistics* targets students between 9 and 19; the Proceedings of the American Statistical Association (ASA) Section on Statistical Education are not refereed and not readily accessible; only the Teacher's Corner section of the ASA publication *The American Statistician* is a refereed outlet for such work. Potential readers are hard-pressed to know where interesting and important published work might be found. We believe that this has two important implications, one for students, the other for faculty.

First, students suffer directly from the inability of statistics educators to exchange ideas related to the teaching of statistics. University statistics courses have a reputation for being difficult and uninspiring. Yet there is a great deal of enthusiasm among statisticians concerning new pedagogy in our field. Sessions on statistics education at our professional meetings are both well attended and enthusiastically received. The 1992 ASA Winter Conference on Statistical Education broke previous Winter Conference attendance records. An electronic discussion list on statistics education, EDSTAT-L, begun in our department in October 1991, had 500 subscribers in a matter of weeks and continues to have an active international following of contributors and readers. There is considerable interest among teachers of statistics in using technology, student projects, cooperative learning, and hands-on activities with students; but aside from those venues already mentioned, there are limited opportunities to disseminate information about such teaching strategies, materials and philosophies. In addition, the fact that teachers of statistics are found in departments of mathematics, psychology, and sociology, in addition to departments of statistics, makes communication both more difficult and more important.

The second important implication of the paucity of outlets for such work is its effect on the faculty. The traditional reward system in colleges and universities lays heavy emphasis on refereed publications as a basis for peer evaluation. Presentations at meetings and papers in Proceedings volumes, the common outlets for scholarship in statistics education, carry relatively little weight in evaluations of faculty productivity. This discourages statisticians from investing time and energy in such scholarship. In addition, it is difficult to evaluate the contributions of those faculty members who do elect to emphasize statistics education in their careers. A new, rigorously refereed journal could mitigate this concern.

## Feasibility Assessment: The Workshop

Armed with these convictions, we set out to see if they were shared by others. We began by identifying people across the country who had contributed to the improvement of statistics education. We made some preliminary inquiries by phone and, encouraged by the responses, developed a list of people to invite to a workshop that we would host. The idea was to bring knowledgeable people together to discuss the desirability and feasibility of establishing a new journal and the pros and cons of doing so electronically.

By this time, the success of the electronic discussion list had led us to consider the possibility of distributing such a journal electronically, and we did some research on existing electronic journals. That investigation opened a string of fortuitous connections that proved extremely important and in fact has ultimately led us to this symposium. We discovered that one of the first refereed electronic journals was being published on our own campus. The first issue of *Postmodern Culture (PMC)* appeared in September 1990 to 400 electronic subscribers. One of its editors, John Unsworth of our Department of English, agreed to make a presentation at the workshop. Professor Unsworth alerted us to the important role that the North Carolina State University Libraries had played in the establishment of *PMC*, and we contacted Director of Libraries, Susan Nutter, who also eagerly agreed to participate. We knew that NCSU Libraries was aggressively applying new technologies to the provision of information services, but learned only later that it had cosponsored with the Association of Research Libraries (ARL) the October 1990 predecessor to this symposium. Director Nutter provided us with the first edition of the *ARL Directory of Electronic Journals, Newsletters and Academic Discussion Lists* and ultimately led us to some of the innovators in electronic publishing including David Rodgers, Ann Okerson, Steven Harnad, Charles Bailey and others. This was our entree to the rapidly expanding world of electronic publishing: to SGML and TIFF and GIF, to WAIS and GOPHER (and even ISSN). It also added David Rodgers to our list of workshop presenters.

Although not everyone invited was able to attend the workshop, we sought to be as open and inclusive as possible. We invited representatives of as many constituencies in the academic statistics community as we could identify. For example, we invited the editor of the only existing journal that could be viewed as competing for the same audience. We invited officers of the Statistical Education Section of the ASA, the chair of that Association's publications committee, and a publications officer from the Mathematical Association of America. We sought statisticians from PhD granting statistics departments and others "isolated" in mathematics departments of liberal arts colleges. We sought some whose focus is on curriculum, some with focus on innovative methodology and technology, and others who conduct formal research in

education. We also alerted the Executive Director, President and President-Elect of the American Statistical Association of our plans. Reactions ranged from enthusiastic to polite to skeptical to negative. We collated all of these responses to distribute to the workshop participants.

The workshop was held May 29-30, 1992 and was funded on a shoestring. There were finally 22 participants, many of whom proved able to provide their own travel funds, and we used some end of year department funds to help the others. We catered the meals, met on campus and used department staff.

The one and one-half day agenda comprised three half-day sessions. The first was a discussion of the need and likely demand for a journal in statistics education, the target audience, anticipated content, and quality criteria. Largely for the reasons noted earlier, the participants agreed that establishing a new journal dedicated to postsecondary statistics education is desirable and preferable to seeking to modify the focus of existing ones. A recent study by the Mathematical Association of America provided information about enrollment in statistics courses and the departments that were offering them. With this assistance, we identified the potential audience for the journal as 2- and 4-year college and university statisticians in mathematics or statistics departments as well as mathematicians, social and behavioral scientists and any others who teach statistics in colleges. Indeed innovative ideas for the teaching of introductory statistics can be of value to middle and secondary school teachers as well.

The new journal would include high-quality articles on a variety of topics related to the teaching of statistics, for example, results of controlled experiments on pedagogical methods, case studies, review and opinion articles, discussions of the impact of new technologies and new methods of assessment on statistics education. The workshop participants agreed that the journal should be rigorously refereed but debated what the criteria should be. Peer referees and target audiences might hold views that are at odds. What a tenure and promotion committee will take seriously may not serve the needs of the readership. Although we hope that the journal will become a prestigious place to publish, the participants concluded that editorial priority should be on publishing work that is interesting and useful to teachers of statistics. Rigorous refereeing will help to establish the journal's prestige (as would professional society sponsorship), but criteria for refereeing must be flexible. For example, a "something to try in the classroom" paper might be judged on the quality of exposition, the novelty of the idea, the ease with which it can be used by others, and the measure of its success.

The second session focused on the electronic medium and featured presentations by Susan Nutter, Director of NCSU Libraries, John Unsworth, co-editor of *Postmodern Culture*, and David Rodgers of the American Mathematical Society. Director Nutter

quantified the spiraling cost of print journals and its impact on the scholarly environment and conveyed her vision for electronic publishing. Professor Unsworth explained the operation of his electronic journal, while Dr. Rodgers discussed his society's work on electronic publication and advised us on document structure and search ability, technology to provide broad accessibility, distribution methods and the technical potential of the medium. Perhaps his single most important recommendation is to think of an electronic journal not merely as an expeditious way to distribute a print journal, but as a completely new vehicle for scholarly communication.

The final session of the workshop covered organizational, administrative, legal, financial and "political" matters. We found the editorial structure and operating procedure of *Postmodern Culture* quite attractive and agreed to proceed to establish a journal along those lines. In matters of ownership, costs, and copyright, many more questions were raised than answered. We did agree to approach the American Statistical Association's Section on Statistical Education and request their sponsorship, and in particular to invite the Section to name an advisory board that would establish editorial policy and be responsible for editorial succession. The motivation for seeking Section sponsorship rather than encouraging the parent Association to publish the journal, is to gain the credibility of an affiliation with our primary professional organization without encumbering the initial development of the journal by inviting oversight of the full ASA Board.

The workshop participants were unanimous in their wish that the journal be distributed without charge and that not-for-profit use of its contents be made free and easy. Since most of the labor would be free, and the equipment and technical expertise are available in our department, we saw this goal as realistic. We were nervous about our naiveté in these matters, and indeed some of the earlier detractors, particularly those involved in publishing print journals for the professional societies, dismissed our efforts on just these grounds. Nevertheless, we press on.

## **The Current Vision**

Editorial Structure and Management: Key personnel for what we now have agreed to name the *Journal of Statistics Education (JSE)*, include an Editor with a 3-year term to be the final arbiter of what is published, a Managing Editor with responsibility for the technical/electronic areas, and an Editorial Assistant. The hardware has been provided by and is located at NCSU as is the founding staff: E. Jacquelin Dietz as Editor and J. Tim Arnold as Managing Editor. There is an international Editorial Board with a target membership of about 25 serving staggered 4-year terms.

A Submissions Editor will be selected from among the members of the Editorial Board (with the founding Editor serving as the first Submissions Editor) who will serve a 6-month term and handle to their resolution all material initially submitted during that term.

*JSE* will have several "departments" with their own editors. Proposed departments include "Media Highlights," briefly summarizing pertinent items published elsewhere, "Reviews" of software and other teaching materials, and "Data Sets and Stories," providing data sets and contexts useful in teaching statistics. The reviews are to be descriptions of an instructor's experiences actually using the software or other material rather than the traditional textbook or software reviews found elsewhere.

A parallel electronic discussion forum will be maintained, moderated by the Managing Editor. This discussion group will allow readers to communicate among themselves on issues related to articles in *JSE*. Highlights of recent activities on this discussion group may appear in the journal's Media Highlights department.

The Editor appoints the Submissions and Department Editors as well as the Editorial Board members, while the Executive Committee of the ASA Section on Statistical Education will appoint future Editors.

Policies and Procedures: Initial submissions will be directed to the Submissions Editor. Provided that she finds the work suitable for the journal, she will seek three referees' reports. Two of the referees will be members of the Editorial Board. The third will be self-nominated. The Submissions Editor will broadcast the title and abstract of each submission to the discussion forum with a request for self-nominations. She will select the third referee based on credentials provided by the self-nominees. Refereeing will be double-blind. Self-nominated referees and double-blind refereeing will increase accessibility to the journal for new reviewers and authors.

The journal will be maintained as an information data-base, by an information server that will handle requests for material. The server will offer instructions for authors, suggestions on how to use the medium to advantage, and tips to users. Where required, we will accept plain text files and provide assistance in structuring accepted documents for the data-base. Whenever articles or items in the departments are ready, they will become accessible; the Table of Contents will be evolving and its current entries always available. For convenience in archiving and retrieval, quarterly issues will be declared to include whatever has accumulated at the end of each quarter. Note that an issue may well include material accepted by multiple Submissions Editors, explaining the choice of that term. When an issue is declared to be complete, its Table of Contents including abstracts will be sent to all subscribers on the list.

Subscribers may then browse and request as much or as little of the journal as they wish. Electronic subscriptions will be free. For subscribers without electronic access, we will make the information available in other forms at cost.

Capabilities: There are scholarly benefits of making the journal electronic that extend beyond the practical ones of saving paper and printing costs and shortening the time lag associated with publishing in print journals. (Note that there will be no backlog of accepted papers.) The medium will allow us to include dynamic and interactive graphics, sound, or even video clips in an article. It will be possible to download a data set used in an article or department for re-analysis or use in class. The timeliness of the parallel discussion list, the ability to access articles as they become available, and the capability to query and search the entire archived journal are unique features of the electronic medium. Details of the minimum technical requirements for authors and subscribers and the plan to provide different levels of service to differently equipped subscribers are described in the final sections of this document.

## **Recent Developments**

Since the workshop in May, we have been continuing to build support from the statistics community, seeking funding, establishing the Editorial Board, planning the first issue, setting up hardware and software, exploring technological and legal issues, and refining our thinking about editorial policy and procedures.

Building Support: The Annual Statistical Meetings in August provided an opportunity for the workshop group and others to gather for further discussion. We also made presentations at several committee meetings including the Executive Committee of the ASA Section on Statistical Education and won their endorsement. We have continued to keep the Executive Director and President of the full ASA apprised and enthusiastic about the potential for eventual ASA ownership. Some others however continue to see the effort as hopelessly innocent, particularly with regard to its economics.

Funding: We have made an exploratory overture to the National Science Foundation for start-up funding and have submitted a formal proposal to the Fund for the Improvement of Postsecondary Education (FIPSE) of the U.S. Department of Education. This proposal requests salary support for a teaching reduction for the editor, half time support for an editorial assistant, and funds for hardware and software as well as for some travel and operating expenses. Our department will contribute the time of the Managing Editor as well as general support for computing and communications infrastructure. Except for the Editorial Assistant, all members of the Editorial Board and staff are uncompensated for their service to the journal.

The Statistical Education Section of ASA is supportive of the idea of increasing Section dues to defray journal expenses on a continuing basis. In this way, Section members can support improved statistics teaching for all. Other funding sources being discussed include voluntary "page" charges, voluntary subscriber contributions, and issue sponsors (not advertisers but donors as e.g., credited in public television broadcasts). If the American Statistical Association eventually adopts the journal, the costs will be borne out of Association revenues as are those for its print journals.

Legal Matters: We have made little progress on matters of ownership, liability and copyright. Even filing for an ISSN number raised questions about our status as a legal entity. We have met with our university counsel and our intellectual property officer but have as yet reached few conclusions. (Aside: we came away from that meeting unpleasantly surprised at how little legal protection we have from our employer!) Our tentative copyright strategy is to give authors copyright to their individual articles but to have the journal retain copyright to the complete issue. Copies made of journal material will be expected to include the full copyright statement and source. Authors will be expected to sign a detailed agreement that permits free sharing of published items among individuals for non-commercial use. It will permit archiving of complete issues for public use as long as no fee is charged to the user. Authors also must agree not to submit work to a second journal simultaneously nor publish elsewhere materials published first in *JSE*.

The First Issue: The Editorial Board is now largely in place as are the Department Editors, and we are building the first issue. It will include only invited contributions. We have attracted to the task some of our most distinguished colleagues who have agreed in this way to help us launch the journal. A feature article will be a conversation between one of the earliest innovators in statistics education (the host of a "Continental Classroom" of 1960 early morning television) with one of the most respected statistics educators active today (the person responsible for the recent Annenberg/Corporation for Public Broadcasting series *Against All Odds*).

Another goal of the first issue is to provide an example of the capability of the electronic medium. Although we might not be ready with "Continental Classroom" clips for the interview piece, one article being prepared should suggest new possibilities. In June, 1992 a conference was held for the principal investigators of a dozen NSF-funded projects in statistics education. A near-universal concern of those present was effective dissemination of their work. To make information and materials from these projects available to teachers of statistics, we plan to briefly describe the dozen projects in a summary article. Readers can then request from the server the amount of information they desire on individual projects: a two-page abstract, a more detailed description of materials being developed, or even, in some cases, the actual materials - data sets or lab instructions and exercises.

So where are we? We have passed the point-of-no-return, and in a matter of weeks, after we are comfortable about the progress of the invited articles, we will announce the existence of the *Journal of Statistics Education* with the first call for papers.

## **Technical Considerations**

The technical goals of the *Journal of Statistics Education* are driven by its scholarly goals and the needs of the journal's readers and authors.

Certain demands are placed on the technical implementation because of the subject matter itself. In the field of statistics education, graphics, tables, and equations are often employed in discovering or communicating knowledge. These information types present challenging obstacles that must be overcome to realize the journal's full potential.

The short term technical goals of the *JSE* are to:

- o reach as wide a readership as possible,
- o provide both textual and graphical information,
- o provide an easy to use archival/retrieval system,
- o educate readers concerning network resources, and
- o provide tools to allow readers to exploit these resources.

Although special arrangements may be made for readers with no network access, the defined minimum capability a reader should have is to be able to:

- o view text on a standard device emulating a VT100 terminal,
- o view graphics delivered in Graphics Interchange Format (GIF), and
- o have access to the Internet, at least by electronic mail.

Given these abilities, the system will communicate with readers through electronic mail, receiving requests and sending back information in the form of text and/or graphics files. This same information system can send tutorial files and computer programs to help educate readers and enable them to make more efficient use of the journal. As a reader's technological capabilities increase, new types of information access will become available, such as search capabilities or interactive graphics.<sup>2</sup>

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<sup>2</sup>The goal of reaching a large number of readers and the definition for minimal capability together imply that textual materials should be presented as plain text. The printed form of the text, including details such as fonts and typefaces, will not be treated in the short term. As some current projects mature (see Future Considerations) the *JSE* will test and implement technology that will benefit its readers.

Receiving Material: When possible, the *JSE* will receive material from its authors, referees, reviewers, and editors by electronic mail. If this is not possible, materials on diskette or paper mail can be accommodated.

The preferred format for receiving information is plain ASCII text files with accompanying graphics provided as a separate file in Graphics Interchange Format (GIF). Although submission of other graphic formats or word processor text formats are discouraged, some types still may be accepted.

In preparation for possible future conversion to a textual archiving format, special rules for text format and mathematical expressions are defined. The *JSE* guidelines for authors will specify a rigid structure for placement of titles, keywords, author names, spacing between paragraphs, etc. Mathematical material will be represented in LaTeX markup style. Examples are

$$\Phi(x) = \int_{-\infty}^x \phi(y) dy$$

and

$$y = \frac{a+bx}{c+dx}.$$

The reason for the rigid spatial structure and the awkward looking mathematical expressions is that at some point we will convert the journal's contents to an instance of Standard Generalized Markup Language (SGML). It is hoped that the rules of text placement and the LaTeX mathematical expressions will make this future conversion to SGML somewhat less burdensome (see Future Considerations).

Dissemination Methods: Announcements and Discussion Groups:

Two electronic mailing lists will be maintained as adjuncts to the *JSE*. First, "jse-talk" will be an electronic forum dedicated to discussion and debate concerning material appearing in the journal. Another mailing list, "jse-announce" will be used to announce the quarterly issues of the *JSE*. This mailing list will exist to accommodate readers who do not want to participate in or read the discussions on jse-talk, but would like to be informed of new issues of the journal.

The announcements will contain for each issue the Table of Contents, article abstracts, departmental synopses, and instructions for retrieving materials. The announcements will be broadcast to both jse-talk and jse-announce. The jse-talk discussions will also be broadcast to a UseNet newsgroup for readers who prefer to use that electronic communication tool.

Dissemination Methods: Information Requests and Retrieval Methods:

Although journal issues will be declared quarterly, articles and departmental materials will be available for browsing and retrieval immediately following their final review, revision and acceptance. Readers have the following options in viewing and/or retrieving information from the *JSE*:

(1) Readers with e-mail access may request an article from the archive server by sending a command via e-mail to the server. An example message might be:

send moore.3.92 from jse

The server program would then retrieve the article along with any graphics files that accompany the text and send the material in an appropriate format to the reader. Graphic files will be encoded before mailing. Readers may request a set of software tools that will unpack, decode and present the graphs on a local machine.

(2) Readers with telnet access may connect directly to the *JSE* information server. They login as "guest" and browse the current contents of the journal, or they may search or view archived issues. After browsing, the reader can request that a personal copy of the article be sent via e-mail. This method employs the simple VT100 Gopher system client interface. Readers may also search the journal archives interactively, using the full-text indexing capabilities of the Wide Area Information Server (WAIS) software.

(2a) For readers who would like to install a Gopher client system on a local computer, software and instructions will be provided. These readers may then connect to the *JSE* information server (or any other Gopher server) with a single command.

(3) Anonymous file transfer will be available for those readers familiar with the file transfer protocol (ftp). The capability as implemented in the *JSE* archive, will provide on-line help messages to guide the reader through the hierarchy of issues and articles. The reader can transfer the article or other material to a local computer. A tutorial on how to use anonymous ftp will be available to all readers via either electronic mail request or through the on-line Gopher browser system.

(4) Readers who can run X-windows software on their local machine may directly connect to the *JSE* information system. They log in as "xguest" and enter the information system via an Xgopher window. This method employs a graphically oriented point-and-click interface. Readers can browse the journal contents, viewing graphs on command. E-mail delivery of articles or other information may also be requested interactively.

For all of these methods, a log will be kept of what information is being accessed and what access methods are being used.

Future Considerations: Technology changes too rapidly to be certain of future capabilities or new initiatives. However, some current initiatives are gaining a wide acceptance in the field of electronic document delivery. Two are of particular importance: Standard Generalized Markup Language (SGML) and Multipurpose Internet Mail Extensions (MIME).

As the software tools to convert, edit, and browse SGML-tagged documents become more standardized and wide-spread, the *JSE* will convert from plain-text documents to an SGML-based archive. In this way the archive will become an informational database, easily queried by readers.

However, there are several obstacles in our path:

- o We currently know of no SGML document type definition explicitly created for a scholarly journal, and particularly not for one requiring extensive tables and mathematical equations.
- o To be able to present SGML tagged documents to readers, we will need to convert the document to another format such as LaTeX, Postscript, or plain text. The development of this conversion system will take considerable effort.
- o Once we have converted a document to any other format (except for plain text), it remains unclear how to provide a free text-viewer to our readers because of the proprietary nature of the necessary fonts.

Nevertheless, SGML is proving to be popular with many electronic information providers and producers. The above obstacles may seem obsolete in a very short time. We fully expect to convert *JSE* documents to SGML, although the timetable is still uncertain.

The MIME specification will allow mail messages to contain many different types of information, from graphic images to sound files to text in specific formats, even text using special character sets. Though this specification is young, it is gaining support rapidly in several different sectors. As software companies and individual programming initiatives begin to standardize on this specification, the *JSE* will make articles containing multimedia information a possibility for its readers.

## **Technical Appendix, *JSE* Information System**

### Hardware:

Sun SPARCstation IPX, SunOS 4.1.3, Openwindows version 3.0.  
Current disk space: one gigabyte.

## Software Implementation:

### High-Volume Mailer Transfer Agent

Both the "zmailer" and "MMDF" public domain mail transfer agents are being tested.

### Listserver

The Unix listserver package will be used to run the *JSE*-related mailing lists.

### Archive Server

The public domain "Squirrel" archive server will be used to accept e-mail requests from readers, process, convert, and encode or split documents and mail them to the requesting reader.

### Gopher Information System

This is an on-line information system (both server and client implementations) with links to other information servers and sources.

Xgopher client software provides a point-and-click user interface to the Gopher information system. It allows immediate viewing of graphics.

### Ongoing SGML Experimentation

Public domain "SGMLS" parser/validator

Conversion systems: Qwertz SGML to LaTeX converter software  
Integrated Chameleon Architecture package

### Viewers, Unpackers, Decoders

A collection of software tools is being constructed from publicly available free software archives. These tools will give readers the ability to unpack, decode and view graphics files, play sound files, and join multipart messages back together for viewing.

### WAIS

All *JSE* informational materials will be indexed and available through the *JSE* WAIS server.