

EVOLUTION OF A UNITED STATES INFORMATION SYSTEM*

Nora H. Jason

National Institute of Standards and Technology

Gaithersburg, MD 20899 USA

SUMMARY

As part of the current information activities in the United States, the Conference for Exploration of a National Engineering Information Service is discussed, in addition to the Internet and the proposed NREN (National Research and Education Network). Challenges to the fire community to bridge the information gap are presented.

INTRODUCTION

More and more we hear about or read the term "information superhighway." This "highway" will link anyone with the hardware (a computer) and the software to others anywhere in the world if they too have the appropriate hardware and software. One will be able to send and receive messages instantaneously, to exchange text or numeric data, and graphic information. A recent article in the Washington Post noted that if you wish to communicate with President Clinton you can reach him via e-mail on MCI Mail, CompuServe and America Online and Internet.[1]** An Internet address,

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clintonpz@aol.com, forwards mail to his America Online account. Events related to the information highways will be discussed, as well as how we may participate as engineering and information professionals in this technological advancement. The 1992 Exploration of a National Engineering Information Service Conference, the proposed National Research and Engineering Network (NREN) and the Internet will be briefly presented.

CONFERENCE FOR EXPLORATION OF A NATIONAL ENGINEERING INFORMATION SERVICE

In June 1992 the Council on Library Resources and the Engineering Foundation held a conference for Exploration of a National Engineering Information Service.[2] The engineering profession does not have the information tools available to it as some other professions; for example, the health community has the National Library of Medicine, the agriculture community has the National Agricultural Library. The attendees at the conference reflected the diversity of the engineering community, including engineering educators, engineers, librarians, information consultants, publishers and database vendors. Access to and the exploitation of engineering information and data needed to be improved to enhance the competitiveness of the United States. After technical presentations to provide each participant with a general background, professional facilitators led a series of workshops designed to develop a list of recommendations and an action plan. Some of the features of the action plan that may be implemented immediately or in the near future by this audience, as well as the three institutions that have advanced degrees in fire protection engineering, were discussed.

Conference Recommendations

For the long term effort, it would be necessary to commission a group of high-level experts to articulate the needs of a nationwide information network and to identify its parameters. The national network could build upon the proposed NREN (National Research and Education Network) and the existing Internet. The concept of a "virtual library" was proposed as the appropriate model in lieu of a physical, national library located in the Washington, DC area, such as the National Library of Medicine.

However, it also was felt that there was sufficient expertise amongst the participants to put some of the ideas into action when they returned to their institutions. A coalition was formed to communicate regularly and to develop pilot projects that could be used as models by the experts.

Initiatives were identified and several are noted:

- a. The conduct of a concerted effort to incorporate into university curricula appropriate courses in engineering information and data.
- b. The building of coalitions among groups of people with existing information-related activities.
- c. The voluntary conduct of self-funded pilot projects.
- d. Active electronic network conferencing by the participants.

There was a discussion about expanding the information activities to include all scientific and technical information. The consensus was to limit the focus of activities to engineering; once the engineering activities are in place the issue of expanding the coverage to all scientific and technical information can be revisited.

INTERNET

The evolution of Internet as we know it has had a very interesting history in a relatively short period of time. It originated with ARPANET, an experimental network established in 1969 by the Defense Advanced Research Projects Agency (DARPA). Its purpose was to link electronically the United States military and academic research community via a computer network based on packet-switching technology. Internet protocols were developed by DARPA; they were a set of rules and procedures for addressing and routing messages across separate networks so they could be linked together. MILNET was established by the Department of Defense in 1983 to reduce some of the traffic on ARPANET. The National Science Foundation (NSF) assumed the responsibility of coordinating the development of Internet for the academic research community within the Federal government in 1985. The establishment of the NSFNET (a backbone network to provide remote access to the NSF supercomputing facilities) enabled regional and local area campus networks to connect researchers at more than 220 colleges and universities. The Internet also has networks from other government agencies; the Department of Energy (HEPNEG, MFENET, ESNET), the Department of Health and Human Services, and the National Aeronautics and Space Administration (NASNET, SPAN).[3] The 1993 Internet is composed of regional, local and Federal networks; all of the networks use the Internet protocols.

Recently there have been a number of books written about Internet. If you are a novice or a veteran user, one of the most comprehensive books is Ed Krol's *The Whole Internet; User's Guide & Catalog*. [4]

Internet Users

Internet users are no longer from just the scientific community or the United States. The addition of various networks have increased the range of users from educational institutions and libraries. Tom Grundner's recent article [5] asked why K-12 (kindergarten through high school) schools, businesses, and the general public cannot have access to Internet and the proposed NREN. His position is that these networks are paid for and maintained by the taxpayer and they should be accessible to the taxpayer. It is not the purpose of this discussion to further exploit this topic no matter how provocative. However, part of the problem may be addressed by other projects, for example, Blacksburg, Virginia, has been selected as a test site by the Virginia Bell Company to hook the entire community via their telephones. [6]

How Internet is Used

Electronic mail probably accounts for the greatest amount of traffic on the Internet. One is able to communicate with colleagues in the United States, Europe, Asia and Australia on a one-on-one basis. You can save and mail files, transfer files to local computers and print at your own site or a remote location. Libraries use electronic mail to request ILLs (Interlibrary Loans), to ask reference questions, and to identify document sources. Some libraries are using e-mail as a way of reducing staff time when doing Dialog searches and shipping the search results directly to the client. [7]

Electronic publishing is another growing activity on the Internet. The number of electronic journals is increasing rapidly. However, several important questions still need to be addressed: availability of articles; completeness of article (e.g., graphics availability); retention time; who will archive all issues. These issues are critical to the success of paperless publishing and must be addressed before the information is lost.

Complete reports with data and graphics are shipped around the networks, commented upon, and finalized without ever using a piece of paper. A recent fire modeling conference organized by John A. Whitlock at CSIRO, Australia, was done completely on Internet; that is, all papers and graphics were sent, captured, and then printed on-site, all correspondence and conversations also were held this way.

Exchange of software and data files also is very popular. This is similar to the bulletin board activity, except one now has access to even more information as there are many bulletin boards on Internet.

Computerized databases, whether they are commercial or government, are accessed regardless of their location.

Computer conferences with and without moderators are used. Libraries also are involved with this type of information exchange; the exchange may range from one message a month to many messages per day. This may be considered another variant of e-mail.[8] However, the concept of "conference" also includes sharing of computer CPU time, computer chat lines, interactive graphics (white boards which both ends can draw on).

The challenge facing users of Internet is how to locate and to organize the information, as the indexing and retrieval technology is relatively new. There are several ways to locate information: Archie (a system to locate files that are publicly available by anonymous FTP); Gopher (a menu-based system for exploring Internet resources); WAIS (wide-area information servers ... a very powerful system for looking up information in databases or libraries); WorldWide Web (a hypertext-based system for finding and accessing Internet resources). These systems are still in their early developmental stages and they must be enhanced considerably to reduce the frustration of the user faced with too much information and not enough techniques to winnow the information into a workable body of knowledge.

inFIRE Uses and Users

Information exchange and interlibrary loan (ILL) are immediate benefits to inFIRE members. Several inFIRE members are on Internet and can exchange ILL requests. We also are able to ask reference questions and to obtain backup references for all of those knotty questions that arise. Several inFIRE members access Internet via CompuServe or BITNET as their organizations do not have direct Internet connections. Each person should identify what options are available to them in their area.

FIREDOC (the computerized database of the Fire Research Information Services literature collection at the National Institute of Standards and Technology) will be offered as a node on Internet and it will be available to any user on the Internet who has a FIREDOC Identifier and Password. This is an added enhancement to the availability of FIREDOC. Modem access will not be curtailed.

NREN (NATIONAL RESEARCH AND EDUCATION NETWORK)

The proposed NREN is envisioned to be a cooperative effort amongst government, industry, and academia. It would link together campuses and research laboratories, giving high speed access to much unclassified information. One way of thinking about it is that it would be an extended and faster Internet. Although the legislation to create NREN was sponsored by then-Senator (now Vice President) Albert Gore, it has not yet been funded by Congress. It is further envisioned that building upon Internet and the Federal High Performance Computing initiative could create a "National Information Infrastructure" (NII). NII would include a directory of network users, a wide variety of federal databases, and software tools, and knowledge bases for use by artificial intelligence programs.[9]

If NREN is reintroduced during the 103rd Congress, it will show commitment to the project. The motivation to have an information superhighway is slowly growing in the research, education, and library sectors. Hopefully the same information and technological advances will be available to the general public.

INFORMATION CHALLENGES FOR THE FIRE COMMUNITY

As noted earlier, parts of the information network exist in the fire community. There are many bulletin boards in fire departments, the federal government, and in the private sector. ICHIEFS is one example of a USA bulletin board that is used heavily by fire departments. Many users search bibliographic databases such as FIREDOC, or data systems, such as Dialog, either via Internet, CompuServe or directly. Despite all of these riches, there is still an information gap. We need to make the bridge between the student (elementary school, high school, college) or the worker (fire

department personnel, engineer, manager) to the databases (bibliographic or numeric), so that the information will be available to the users.

There are many ways to bridge the information gap. For example:

- a. Create Internet sites and publicize them.
- b. Introduce formal library training in schools and colleges as part of the curriculum.
- c. Require information questions as part of the Professional Engineers examination for the fire protection engineer.
- d. Create continuing education units for information technology at fire conferences.
- d. Write articles on information technology in fire newsletters.
- e. Present fire database at conferences/workshops.

As we prepare to enter the 21st century, we must strive to make as many of the information tools as possible available to all of the people in the fire community. The practicing engineer needs more than the *SFPE Handbook of Fire Protection Engineering* and the *NFPA Codes*. The information professional needs more than access to FIREDOC and Dialog. The firefighter needs more than the *NFPA Codes*. The educator needs more than textbooks. To remain competitive each professional must have access to the best and most current information. It will not suffice to say that money is

a limiting factor. The question is: "Can you afford not to know?" All people within the fire community need to be linked to the information superhighways in the United States that, in turn, will link us to the rest of the world.

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