

# INFORMATION TRANSFER IN THE 21ST CENTURY<sup>1</sup>

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## SUMMARY

The impact of technological advances and some political events are discussed in the context of current information activities. Several examples of new and exciting projects in information technology in print and non-print activities are presented. The role of the information professional and specifically the future role of fire libraries concludes the discussion.

### 1. INTRODUCTION

The date is April 20, 2100. You are in your automobile and the onboard computer is reading the world news to you. The computer states: "The Bodleian Library closed its doors." You are curious, so you give your computer a simple command: "Please summarize the article about the Bodleian." Quickly the computer responds: "The last book has been printed in England. The Bodleian Library has been a copyright library since 1610 [1]<sup>2</sup> and its collection grew at a rate of 1.5 miles of shelving each year. Its American counterpart, the Library of Congress, ceased its copyright function in 2090."

How well prepared are you for the 21st Century? Will your library cease to exist, or will it change its function? We will look briefly at current activities in fire libraries as discussed by the previous speakers. Next we will look at the political changes evolving and then we will talk about the technologies that we know about today and how they may relate to the future.

As we become one world, let us begin with discussing some of the tools that we have at our disposal in the 20th Century.

### 2. CURRENT INFORMATION ACTIVITIES

In their paper, "Linking Fire Communications Through Gateway Communications," Arlene Barnhart and Ann Swing discussed their respective bulletin boards and how they relate to

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<sup>2</sup>The numbers in brackets refer to the references cited at the end of the paper.

electronic communications. As communication speeds go beyond the 9600 baud rate and as more international networks are formed, we will have access to more and more information.

Jeanine Driessens presented an interesting overview of the bilingual (Belgium and English) database, "SHE-INFO: An Information Retrieval System about Safety on the Belgian VIDEOTEX-net." Technical databases are but a minor part of the market. While the banking industry represents the biggest user of today's technology, there are programs designed for the home market as well. In the United States, you can download the stock market information from the Dow Jones<sup>3</sup> database and, by going into the database weekly, for example, you can keep a running record of the stocks you have in your personal portfolio. Home shopping via a computer is available in many parts of the United States. If you have a service called Prodigy<sup>3</sup> you can order groceries via your terminal and the order will be delivered within two hours. The service retains the shopping list of previous orders so you do not have to do too much planning! In France the Minitel<sup>3</sup> system offers a range of services, including directory assistance, shopping, travel reservations, and general information retrieval. There is a modest monthly fee for both Prodigy and Minitel.

The FAX machine has been around since the 1930's but it was not until it standardized on telephone line transmission that it became useful. In fact, many of the arrangements for this conference would not have been possible if one had to rely on the postal system and on the telephone system. The same may be said of the CD-ROM (compact disk-read only memory). It was first designed by Sony as a 12-inch disk. It was quite difficult to fill it with enough music to please even one listener. When the size and the time available for the recording were reduced, then it became economically viable. Libraries also are using CD-ROM technology. One common usage is to obtain popular bibliographic databases for searching in a single-station or a network environment. The savings can be quite substantial when you compare online searching charges vs. the CD-ROM service.

The telephone system is becoming more standardized. Everyone uses a country code, followed by some type of city code, and then anywhere from four to seven digits for the local number. In the United States the next breakthrough will be a personal telephone number used to contact a person (not an instrument) regardless of location, for example, at home, at work, in the car, at the South Pole.

Computer networks--topical, local, state, national, and international--will allow us to communicate (interactively or not) with people across continents or oceans and at an economical rate. One of the biggest and best known is Internet<sup>3</sup>.

In spite of the technological advancements available to the library field, resources and staff have not kept pace with the growth. The resources for collection building and maintenance have become more precious and they must be weighed against other options: how many

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<sup>3</sup>Product identification does not imply recommendation or endorsement by the National Institute of Standards and Technology.

computer terminals to buy for patrons vs. how many books to buy--or--should the library invest in audiovisual material? Staff size is decreasing. It is cheaper to buy a computer with a lot of disk space than to have a staff person who often wants to go on vacation, will probably get sick, and will most likely receive a periodic increase in salary.

### 3. POTENTIAL MARKETS, THE IMPACT OF THE EC, POST-PERESTROIKA

Current members of the European Community (EC) and the next generation of members are noted in figure 1. The potential market of 600 million people stretching from the Atlantic Ocean to the Ural Mountains with no political boundaries, with no common standards and common currency, is awesome. The expanding membership will include Austria and Sweden by 1995; Poland, Czechoslovakia, and Hungary by the end of the 20th Century, plus Turkey, Cyprus, Malta, Finland, Iceland, Liechtenstein, and possibly Switzerland and Norway. Associate memberships may be possible for many states which were formerly part of the USSR (now called the Commonwealth of Independent States). With the ECU (the EC currency), the trading possibilities are enormous as no monies will be lost to fluctuating exchange rates. It will overshadow the markets of the United States and Japan.

Political changes are not limited to the European Community or to the Commonwealth of Independent States but can be seen around the world. The problems of information access and information archiving may somewhat pale under current newspaper and television broadcast headlines, but as information specialists we must guard against destroying the past as well as preparing for the future. Existing institutions, for example, the American Library Association and the British Museum, cannot do all of the work alone. Every information professional should consider establishing informal networks to offer assistance to information professionals in those countries that may have difficulty protecting and preserving their heritage.

The opposite side of the discussion, and perhaps the most pressing for us, is how to obtain information we know exists? I advocate efficient clearinghouses for information. Purchasing a standard differs from organization to organization and from country to country. An example of this problem is obtaining EC standards; it has publishers or publishing houses in many countries but there is no easy way to obtain pricing information. There appears to be no one centralized policy on how to handle out-of-print material. Are there depository libraries or archives throughout the world? How effective will the national and international networks be toward identifying these standards?

The stakes are very high. We are aware of and have varying degrees of knowledge of the CEN (European Committee for Standardization). To oversimplify a complex issue, fire test methods and standards will be the key to success or failure for many companies. There is virtually no industry that is immune from competing internationally. Therefore, access to information is more important than ever before. It is essential that all libraries have access to current standards to assist the industrial sector and obsolete versions to document their evolution.

EC Members

- Belgium
- Britain
- Denmark
- France
- Germany
- Greece
- Ireland
- Italy
- Luxembourg
- Netherlands
- Portugal
- Spain



Figure 1

#### 4. COMMUNICATION CHALLENGES

Ralph Miller[3] presents an excellent overview of the development of electronic communications since the introduction of the telegraph in 1847. The breakthroughs that he noted for the Year 2000, for example, text facsimile, telephone-conference, color television, mobile telephony, paging, have been discovered prior to 1990. Many of these developments are critical to information activities today. In fact, the Conference speakers have touched upon almost all of these modes of communications.

Faster and more reliable telecommunications have been accompanied by increased competition and a lowering of worldwide trade barriers. The topic of competitiveness was addressed by the European Community in its June 1987 *Green Paper* on telecommunications. It encouraged competition while protecting the monopolistic control of the member states' telephone companies. Several EC recommendations were:

- ◆ open up the equipment market completely
- ◆ develop the Open Network Provision, i.e., opening the public switching network to all information providers on an equal basis
- ◆ create a European Telecommunications Standards Institute
- ◆ allow competition in provision of all value-added services (basically, this means anything but simple voice transmission) [3].

These recommendations should result in increased traffic (users). To alleviate this problem other methods of transmission must be sought. Fiber optics technically offers the solution to the problem of increased demands on the telephone system. We use the telephone lines for telephones (cellular and stationary), FAX, data transmission, etc. The microminaturization and greatly increased bandwidth of fiber optic cables has greatly enhanced the ability of the equipment to deal with the increased demand by increasing the information carrying capacity.

However, with the potential for access to vast databases of information in a wide array of areas, we will need some way to learn about all of the information that will be at our finger tips. There may be a way!

A new word has entered our vocabulary--"knowbot" [4]. It is really not a thing or a person, but a piece of software currently being developed to enable one to search multiple databases on a network, for example, such as Internet. The knowbot would search many databases, very quickly, for the information requested. It is no longer relevant to use the term "user friendly", as there are too many opinions as to what is "friendly." However, as databases and data systems become larger and larger, this type of software is essential.

Relational databases are being used as one method of storing and retrieving information in full text. As bibliographic databases often have long, repetitive strings, for example, author names, then this type of database would facilitate identifying the string. Relational databases offer a more natural form of querying, at the expense of speed and "overhead." Relational

database management systems are being applied to library applications including serials management, online catalogs, and statistical tracking.

## 5. TECHNOLOGICAL APPLICATIONS

### 5.1 Information Technology Industry

As part of the technological advancement, there is another product called the "all electronic journal." In the early 1980s there was the first blush of an electronic fire journal. I have asked many people if they could remember the title; unfortunately, only a few of us even remember the project. The fire journal had an extremely short life span because the publishers were ahead of their time. Word processing software was in its infancy and there was very little standardization or capability of formatting from one software package to another.

Today the AAAS/OCLC (American Association for the Advancement of Science/Online Computer Library Center, Inc.) have joined forces to develop the On-Line Journal of Current Clinical Trends. The standards for electronic journals are being prepared and there are still some knotty things to work out. The price of the subscription will be the same as the paper copy of the journal. However, no one could quote the cost of downloading an article and, more importantly, how this journal would be archived.

The National Demonstration Laboratory is a "multimedia" project that combines all of the known media today and structures them so that they may be used as a learning tool. It is on permanent display at the Library of Congress. For example, a student may want to do a paper on Martin Luther King, Jr. The student wants to use his "I Have a Dream" speech as the introduction to a talk. The database is queried at one of the computer terminals. There is the option of listening to the video tape of his speech, and the text of it will scroll next to the video pictures, or the text can be printed offline on a nearby printer. Another query would be to learn more important facts about Dr. King. There will be positive and negative information about historical figures or historical events so that the user can make a balanced assessment of the figure or event. The goal of the project is to go from the National Demonstration Laboratory to the classroom.

### 5.2 Information Training Industry

"Virtual reality" (VR) is a new concept that is being discussed at great lengths. Charles Arthur has defined VR as having three parts: "First there are its visual and aural systems, through which the user sees and hears the virtual world. The second part is a manual control for navigating through the virtual world. This can be a simple joy stick, but more sophisticated system provide a glove containing position sensors for the hand or even a suit that extends to include whole limbs or the entire body. Finally there are the central coordinating processors and software." [5] An application for the fire community could be to train fire fighters. There could be two instrumented gloves and they would simulate the pressure of the hoseline and the video could indicate how well the firefighter was

extinguishing the blaze. In the library it also could be an excellent teaching tool. The student could have access to rare books heretofore banned to the casual user, perhaps by sitting at a video screen using a joy stick to walk through the library, to go through the stacks to the Rare Books Room and to sense them, to see them, to be exposed to the art work, and never touch a page of the book. More mundane projects would be to teach the student how to use the encyclopedia, searching databases with *knowbots*, etc.

## 6. LIBRARY COMMUNITY CHALLENGES

There are several topics that should be addressed by us as a subject group, internally within our organizations, and within our professional societies in our respective countries and they are noted below.

Resource sharing and collection development need guidelines. Full-text databases, their retention and access need to be addressed. As technology continues to outstrip our imaginations, it also manages to outstrip our equipment and budgets. Will all electronic records continually be updated and compatible with the newest pieces of equipment? Who will do it? Who will use it?

Not all nations honor the International Copyright Law and the violations of the Law will not be resolved immediately. We first have the attitude of industrialized versus non-industrialized countries, or, those countries that feel they can ignore the Law. The reproduction of print or non-print material still protected by copyright reduces the royalties to the copyright holders. The lack of funding could affect the development of newer versions of the work. How will it effect the sharing of information? As librarians and information specialists we must be aware of and enforce the copyright laws of our respective countries so that existing information can be shared with little or no impediment. The Copyright Clearance Center (CCC) in the United States has yet to share its profits with the libraries. If the profits were used to reduce the cost of journal subscriptions to libraries, more institutions would be in a position to participate in copyright clearance centers worldwide.

### 6.1 Blacksburg, A Living Demonstration Project

The Blacksburg, Virginia, Project is a fascinating one that I would like to share with you as it indicates a wave of the future. Blacksburg is a small college town, with a population of approximately 35,000, located in the Blue Ridge Mountains. About one-half of the town is composed of college students and probably one-quarter of the people are employed in one way or another to support higher education. Therefore, it is not a typical rural community, but it is a homogeneous one.

Blacksburg has been selected by the Virginia Bell Company (the local telephone company) as a test site. All of the homes, apartments, college dormitories, libraries, and businesses will be hooked up electronically via their telephones. Initially fiber optics will not be used because of the costs, but the response time should be quite good as the population is quite

centralized in the Blue Ridge Mountains. Participants will be able to check out or to reserve library books via the computer network. Requested library books will be delivered to their home or office by messenger; they will be able to buy groceries, to talk to their automobile mechanic, to do banking functions and never have to leave the cozy environment of their living facilities. In short, participants will be able to do it all electronically.

Will the Blacksburg Project be expanded nationally? Well, bits and pieces of it already are in place, as I have already mentioned. It is not difficult to see the Project expanding to other university towns that have already wired their dormitories to communicate with other campus facilities.

## 6.2 Role of the Information Professional

What does all this mean for the information professional? How well prepared is the information professional? How far have librarians/information specialists come since graduate school?

Not too long ago I read an interesting article written by Jerry Pennington [6] in 1985:

"Considering the prophecy of the 1970s of the demise of the printed book with its replacement by technology and the substitution of the computer for skilled technical services libraries, it is interesting that articles a decade later should deal with collection development and bibliographic control of monographs by humans."

Will this trend continue, particularly in the fire libraries? Will we assume less passive roles; will we be in a position to provide information to guide businesses toward wise investments, research, etc.? Will we demand more and better research from the library science graduate schools to benefit special libraries?

Where will we, the fire information professionals, fit into this scheme? Are we developing our goals for the 21st Century?

## 6.3 The Fire Information Field

Two areas I would like to see us collectively address are the development of bibliographic and numeric databases. After local development of the databases, we will need to adapt the existing or future networks so that we can query and communicate the information around the world.

Impossible you say! Well, we already have several bibliographic databases, for example, FLAIR [7], FIREDOC [8], and there are a number of single-station databases that could become multiple user on a network. An example of a numeric database is the Fire Data Management System (FDMS). FDMS [9] has been developed by Vyto Babrauskas and several European colleagues (the software was sponsored by the Fire Research Station, UK).

FDMS will provide information from small-scale (for example, the cone calorimeter) and large-scale (for example, compartment fire tests) that can be used by fire modelers throughout the world. A preliminary module may be available in 1994.

The technology exists for bibliographic and numeric databases and the ability to network them. We need to bring not only the databases but also networks into our institutions. We then will be able to use technology to develop value-added information for library information seekers. An example of value-added information would be to present the complete text of several technical papers on a particular topic, as well as test data to support one or more issues, and perhaps unpublished case histories from current authors or investigators.

A dialogue needs to be established so that we can develop and implement a plan of action so that we will have one or more archival institutions (or parts of institutions) that will preserve the history of the fire community. The literature, i.e., journals, is an integral part of the history. As budgets have shrunk and journal costs have escalated, journal subscriptions have been cut. Some libraries may be forced to close. Who will keep the complete holdings of *Firehouse*, for example? We expect that the National Fire Protection Association in Quincy, Massachusetts, will keep all issues of the *NFPA Journal*. There are similar examples on the international scene, such as the *ANPI Magazine*; one assumes it will be kept by L'Association Nationale pour la Protection contre l'Incendie et l'Intrusion in Louvain La Neuve, Belgium. The assumption is made that any reports or conferences generated by a particular organization will be archived by that organization. If the library (or the organization) ceases to exist, those items must be held by one or more fire libraries. A germane example is when the U.S. Fire Administration nearly closed in the early 1980s, much information was discarded and they no longer have copies of many of the reports that they published in the 1970's and early 1980's.

## CONCLUSION

Resource sharing and standardization of existing and future information systems will assist in the transfer of national and international information. Telecommunication costs and the costs of new technologies will require that we be more creative in our cost allocations, as well as resource sharing. Access to networks and network nodes for new bibliographic and numeric databases and bulletin boards will increase in the 21st Century. In concert with the technological advancements and ever increasing telecommunication speeds, we need to preserve the past by ensuring that there is a concerted effort to have archival collection building as an integral part of resource sharing.

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