THE CONVERGENCE OF TELECOMMUNICATIONS AND TODAY'S ACADEMIC LIBRARIES

Danielle Mihram, Ph. D.

University of Southern California

Los Angeles, CA 90089-0182

dmihram@usc.edu

G. Arthur Mihram, Ph. D.

P.O. Box 1188

Princeton, NJ 08542

Abstract

The ultimate result of the merger of the technologies of information systems, broadcasting, and traditional person-to-person telecommunications -- an integrated system -- is already in view, but not so clear are the regulatory [e.g., copyright, electronic carbon copies and postmarks], financial, and commercial/business junctions which will need eventuate. At academic institutions, and particularly so in academic libraries, the "electronic ["digital"] library" will not only maintain the historic role of electronic storage and retrieval but also include "knowledge management" and information delivery roles that have implications in every area of management, services, instruction and research.

I. The Convergence of Technologies

The issue, convergence of technologies, within the telecommunications community concerns the smooth transition of the computer, broadcasting, and person-to-person communications industries, particularly as the digitization (not only of text but also of voice and video recordings) leads to the increasingly noticeable inclusion of at least one computer in our everyday telecommunicative transmissions. Digital signal processing (DSP) will allow microcomputer vendors to incorporate multimedia functionality into their products, turning microcomputers into personal communication centers (Hillman, 1993, 107).

National and international interests in the development of such systems are significant in view of the economic potential resulting from the widespread use of integrated media systems which seamlessly combine digital video, digital audio, computer animation, text, and graphics into a common display medium in such a way as to allow for mixed media creation, dissemination, and interactive access in real time. Infrastructure installation, product creation, and commercialization relating to integrated media systems, have become areas of research and development for a wide range of "players": universities, national and defense laboratories, communications and computer industries, information services, manufacturers of educational products, vocational training, publishing, and entertainment companies.

In the educational and academic fields, the transition to this newer form of working and educational environment necessitates a commitment which encompasses several objectives: to change our basic educational tools, to retrofit installations of school- and campus-wide data networks, and to create affordable networks which would link schools, homes, and communities (Dyrli and Kinnaman, 1994, 92-96).

Currently, few can yet accurately predict the regulatory, financial, and commercial/business junctions which will eventuate from the merger of the technologies of information systems, broadcasting, and traditional person-to-person telecommunications. A systematic and well conceived action agenda is needed to bring industry and academia together into an effective and creative alliance, while issues involving national competitiveness and technological choices need to be studied. (Pelton, 1993, 25-30).

Issues of telecommunicative standards (such as computer-to-computer interfaces among alternative computer hardware/software combinations) and, more generally, of telecommunications policies come to the fore of the debate (Rada, 1993, 17-18). Furthermore, there remains considerable competition -- and therefore, confrontation -- among alternative telecommunicative modes: wire,

fiber optic, radio (including cellular phones and broadcasting), television (cable and broadcast), satellite, and microwave transmissions.

II. Updating the Existing 'Controls' for Our Age of Telecommunications

The current and prevailing, though by no means universally accepted, attitude among providers and users of such technology is the acceptance of the "market place" mentality: viz., the best of these will survive; or, alternatively, each will "earn" that proportion of the market which that market's 'collective mind' demands (see e.g., Brown, 1993, 6-7). Related to this debate are the current calls for legislation relating to intellectual property rights, torts, and contracts (including permissions from unions and guilds), a legislation which needs to be revised and updated to conform to today's dissemination, use, and creation of information in a multimedia environment.

In earlier publications (Mihram and Mihram, 1975, 231-235; ibid, 1981, 30-36; and Mihram, Exposition-University Press, 1975) we introduced the term, "tele-cybernetics", deriving it etymologically to mean 'political science in our Age of Telecommunications', pointing out that we have arrived quite unwarily [into the Age of Telecommunications] from our earlier age of "Enlightened Reason" with its foundation on written and print communications. We also recognized the need for understanding how historically we had implemented a number of 'controls' which themselves permitted the expeditious advancement of human knowledge for the past two or three centuries in the West.

For example, the copyright mechanism was not only a means to ensure financial compensation for authors but also a method for establishing originality among competing scholars, providing incentives to encourage the creation and advancement of knowledge. However, in today's world of networked information and interactive multimedia computer-based applications, experiments in "authoring" are changing traditional concepts of authorship: the blend of various media (text, images or graphics, sound, video, hypertext) goes beyond the traditional narrative and "linear" structure of the printed contribution.

The Copyright Act of 1976, and subsequent case law, has attempted to extend the role of copyright (as it regulated printed knowledge) to include computer-based media. However, there continues to be a great deal of confusion in the courts as to what constitutes "fair use" of electronic media (Jensen, 1994, p. 5). For example, while copyright may be applicable to some kinds of digital publication, it does not address the broader issue of information management in a networked environment, in which "reading" implies both receiving information and reusing it by communicating it to others in order, e.g., to coordinate work. One particular example of this is the hypertext environment : the hypertextual qualities of electronic texts (fluidity, multiplicity, and dispersed control) allow for an interactive environment where authors and readers share the control of authorship because even readers are able to add to the text. This interaction not only challenges current copyright laws but leads some academics to ask not only whether electronic work can be protected by copyright law but should it be protected at all (Bolter, 1994, p. 2). The proper question, we feel, is HOW such work can be copyrighted/protected.

Another example of "control" dates back to Thomas Jefferson's invention and use of a "copying machine" [1]. From this eighteenth century invention came (with the creation and widespread use of the typewriter) the carbon copy as a 'control mechanism' verifying what had indeed been written. However, today's equivalent, the "electronic carbon copy" (Mihram and Mihram, 1981, 30-36; Mihram, 1975) is not being fully utilized as a similar control mechanism. We should have been expecting, since the advent of the telephone, that it would be standard operating procedure that even professional and business telephone calls would be recorded at each end of the communication. With the converging technologies (computer with digital telephone with video screen/monitor) upon us (Mihram and Mihram, 1975, 231-235), it will be easy (and probably commonplace) for one to use his/her own computer to "record" every message received, even voice messages (soon to be all digitized and therefore computer-ready). Not only will this 'electronic carbon copy' be commonplace, but also the 'electronic postmark'

will become standard operating procedure, giving the exact time [Greenwich Mean Time] of any message transmitted and received, as is already the case with many e- mail systems.

Such electronic "tele-controls" should be expected since, historically, the notion of the government controlling the postal service is founded on the experience of the social disorder which resulted before its implementation (The novel, *The Three Musketeers*, actually an historical novel, relates the difficulties [deaths, sword play, etc.] in seventeenth-century France and England which resulted from the hiring of private couriers [2]) . This need for a government-controlled postal system was recognized by the writers of the *US Constitution* in designating it, as one of the seventeen or eighteen responsibilities of the US Congress, as part of the need to "insure domestic tranquility ... and secure the blessing of liberty to ourselves and our posterity." Indeed, with our arrival into an Age of Telecommunications late in the previous century, most nations of the world augmented their postal systems to include tele-communications: PTT = Post, Telephone, Telegraph. It was an American Congressional error to have permitted the "privatisation" of these person-to-person telecommunicative services.

With the ongoing convergence of the technologies, we are going to be confronted with a major difficulty which would not exist today IF we (Congress) had not yielded to appeals for "privatization" [e.g., Western Union, the Bell/AT&T system] in the 1920s. Currently, the pleas for privatization of all these new technologies (e.g., satellite broadcasting/re-transmittal) are usually accompanied by a note that we will all be more speedily rewarded, through privatization, with the merits of these speedier and enhanced communications.

However, the lessons of the *Three Musketeers* should not be ignored: with many and competing telecommunicative carriers operating over the lines and waves, it is possible that (in, say, a time of economic stress) one or more of these carrier-companies may find it more economical to intercept *some* messages than to deliver them unimpeded. The removal of any such danger was the reason for government- controlled (-operated) person-to-person communications [3]

This leads us to our present concern: Cable television was permitted to develop (in the United States, then in Australia, e.g.) under the aegis of "privatization" and its supposed merits. Yet, the pornographic and violent content of cable television generally even exceeds that of the earlier (broadcasting) technology, bad as it was and is. However, cable television should be likened to the subscription delivery (second- class mail) and the delivery of ordered books (special fourth-class mail rates), so that, if every despatch of video material were along government-operated cable, then we would require that its pornographic and/or violent content be clearly labelled as part of its "electronic postmark". Furthermore, as is the case with unsolicited or pornographic literature arriving in the post, a citizen need not hire lawyers or form protest groups (such as Donald Wildmon's American Family Association); rather, s/he proceeds to his local postmaster and the matter quickly becomes resolved in his/her favor. Pornography is thus "controlled".

What we have recommended (both at the 1995 Pacific Telecommunications Conference and at the 1995 SUPERCOMM Conference) is that we begin to recognize the requirement for: (A) a government-operated person-to-person telecommunications service as part of our present-day 'post offices and post roads'; and (B) a standard electronic postmark which includes: (1) Greenwich Mean Time (second/minute/hour) of both despatch *and* delivery; (2) a "caller ID" which, like one's postal envelope in the mails, need not have a return address, but would carry only (for "first-class" transmissions) the country/area code/exchange information. [For purposes of security against treasonous transmissions, the complete caller ID could be retained for a limited time by the government carrier's computers, though with access thereto permitted only under court and/or legislative authority.]; and, (3) both a violence and a pornographic content-level label, one which one's own church, pastor (or say, publications such as *Consumer Reports*) could advise as to its non-acceptability for reception in private residences..

III. Academic Libraries in our Electronic/Information Age

At the microcosmic level, at academic institutions and, particularly so in academic libraries, the "electronic [or 'digital'] library" not only maintains the historic role of electronic storage and retrieval but also includes an information delivery role, one which implies added costs in every area of management: from personnel to facilities, to equipment and resources.

As a rapidly growing group of "technology-literate" high school students now enroll in colleges, their level of expectation with regard to electronic research tools will very soon exceed current demand. Presently, both network access to course materials and an increasing use of multimedia in the General Education curriculum in many institutions are already causing libraries to expand their services beyond traditional boundaries, while the professional roles of librarians in the educational mission of academia are being redefined. Indeed, as Paul Evans Peters [Executive Director, Coalition for Networked Information] recently noted, "Some of the most important questions about the quality of life and mind in the Information Age hinge on the library community's ability to realize that it is in the vanguard of this new period." And, he adds, "while we may not be able to alter summarily the views of those outside librarianship who are unfamiliar with our role and accomplishments, that should'nt stop us from changing our view of ourselves -- and *changing it quickly* [emphasis added]".

Indeed, as research in networked information and the development of digital libraries continues to grow, projects requiring multidisciplinary collaboration (engineers, computer scientists, and librarians) have ambitious goals. For example, the Stanford Integrated Digital Libraries Project (one of six 1994 winners of research co-funded by NSF, ARPA, and NASA) is to develop technologies that enable users to interact with a single universal "virtual" library that is composed of large numbers of distributed and heterogeneous repositories. One successful strategy (for academic libraries to meet the needs of their expanding role both in the instructional and research arenas) is to identify and develop programs which best support not only their specific institutional educational and research goals but also their institution's competitive recruitment

programs of both new faculty and new students. Such a strategy has been a driving force behind the University of Southern California's [USC's] libraries. For example, within the libraries, our Center for Scholarly Technology [CST] evaluates, develops, implements, and supports new and enhanced products and services in library technology and information resources in support of instruction and scholarship. Among current programs and projects are various forms of faculty outreach (software development in teaching and research), the installation in libraries of "InfoKiosks" (touch-screen-based information kiosks which feature library and special events information as well as context sensitive maps [4]), the development of USCgopher and USCWeb, and participation in University-wide multi-disciplinary research projects such as *Information System Los Angeles* [ISLA], a demonstration ["knowledge management"] project to develop national standards for accessing and linking multiple information databases in diverse formats. Information relating to CST's activities is available on the World Wide Web at http://cwis.usc.edu/Library/CST/index.html (USC's home page: http://www.usc.edu).

A major feature of the work of USC's libraries is their close collaboration with an essential partner in such endeavors: the University's Computing Services [UCS]. One (among many) of UCS's current projects is the installation of a university-wide system which will make it possible for any platform or any system to interact in a 'seamless' fashion for the user. The goal is to make it easy for a student to take a laptop, "plug-in" anywhere on campus, and access information seamlessly. While technologically this task is not difficult to accomplish, the need to incorporate security-related boundaries (e.g., restricted access to administrative files or student records) requires that such a system be carefully designed. Implementation of electronic postmarks would be here, like everywhere, quite rewarding. A current collaborative project of UCS with the University's Leavey Library [6] is "mobile computing": the establishment of a wireless network around the University so that students will be able to "plug-in" anywhere on campus by means of a wireless modem installed in their own

laptops [6]: in the library, in class, in their dormitories, or outdoors, on the grass if they so wish.

Because of exceedingly rapid software and database developments, as well as the need to avoid the negative impact of equipment obsolescence on academic libraries' instructional programs, librarians are experiencing the need to keep up not only with the evaluation of "content" (both print and electronic) but with format and medium (CDs, electronic texts, multimedia, Internet resources). The sheer volume of such various forms of information distribution and dissemination necessitates vigilant strategic planning by the administration within an academic library, so as to balance staffing needs and budget to support such programs.

At USC the libraries are major players in the University's instructional and research mission. This vision calls for the requirement that library faculty keep up with what new developments are looming ahead in the fields of information and technology and so inform their colleagues on the teaching faculty. Professional development, continuing education, and training programs within the libraries thus become essential (yet costly) parts of administrative planning. Some (among many) successful solutions at USC include the Library's Lectures and Seminar Series (invited speakers and tele-conferencing, with a programatic focus on technology), seminars organized by the Library's Professional Development Committee (programs focusing on management, and featuring faculty and staff from within the University), and a very successful collaborative instructional program offered by both librarians and the staff from UCS: *Adventures in Information*, a semester-long series of workshops and seminars (offered each semester and open to everyone on campus) dealing with all aspects of technology as well as resources on the Internet.

Currently in progress at the University's Doheny Memorial Library [7] is the planning for an electronic research center which would support the research needs of faculty working with digitized texts, images, sound, and video. Though such centers exist in other institutions, the envisioned scope of the USC

electronic research center is broader and includes future programs for interns, postdoctoral fellows, and team- teaching by library and teaching faculty. Clearly, this very selective overview (of the many programs and projects currently under way at USC's libraries) does suggest that librarians in academic libraries are now working within fields that are very much at the heart of the technological debate relating to the convergence of technologies, their standardization, the policies that regulate their use, as well as the channels (networks) through which information is distributed and disseminated. Merely providing access to information can no longer remain the sole concerns of academic libraries of today, and most certainly of those of tomorrow.

Notes

1. Two pens attached in such a way that the writer, by using one pen, could obtain a duplicate copy as the second pen moved in an identical fashion on a second piece of paper.

2. Issues of allegiance to country versus the lure of money are paramount in this novel. One might note that the French consider Cardinal Richelieu (the character in the book is based on the real-life individual) as the founder of their postal service.

3. Rightly suspected treasonous or pornographic materials being excepted from such interception.

4. The kiosks were featured in 1994, at USC, at the mid-winter meeting (Los Angeles) of the American Library Asociation.

5. This library, which opened as recently as September 1994, features state-of-the-art equipment and innovative instructional programs which include multi-media as an intrinsic part of undergraduate courses.

6. Or a laptop which can be checked out (as one would a book) at a circulation desk.

7. The Research Library for the Humanities and the Social Sciences.

References

Bolter, Jay David. "Authors and Readers in an Age of Electronic Texts." Paper presented at the 31st Annual Clinic on Library Applications of Data Processing (University of Illinois at Urbana-Champaign, 10-12 April 1994): see *Library Hi Tech News* 114 (Jul-Aug 1994): 2- 3.

Brown, Bob. "Oracle, IBM Foray into New Markets." *Network World* (May 17 1993): 6-7.

Dyrli, Odvard Egil and KINNAMAN, Daniel. "Preparing for the Integration of Emerging Technologies." *Technology and Learning* 14(8) (May- June 1994): 92-96.

Hillman, Garth. "The Future of Personal Computing: Digital Signal Processing Fuels Changes as the Multimedia Era Nears." *Electronic Design* 41(24) (Nov. 22 1993): 107.

Jensen, Mary Brandt. "Cohabiting with Copyright in an Electronic Environment." Paper presented at the 31st Annual Clinic on Library Applications of Data Processing (University of Illinois at Urbana-Champaign, 10-12 April 1994): see *Library Hi Tech News* 114 (Jul- Aug 1994): 5-6.

Mihram, Danielle and Mihram, G. Arthur. "Tele-cybernetics: Policies for Converging Technologies," in *Proceedings, 17th Annual Pacific Telecommunications Conference*, pp. 231-235, 1975.

Mihram, Danielle and Mihram, G. Arthur. "Tele-cybernetics: Today's Challenge," in *Proceedings, Pacific Telecommunications Conference*, B6: 30-36, 1981.

Mihram, G. Arthur. *An Epistle to Dr. Benjamin Franklin*. New York: Exposition-University Press, 1975.

Pelton, Joseph N. "Toward a New National Vision: A Blueprint for America's Information Highways." *Telecommunications* 27(9) (Sept. 1993): 25-30.

Peters, Paul Evan. "Information Age Avatars." *Library Journal* 120(5) (March 15, 1995): 32-34.

Rada, Roy. "Standards: The Language for Success." *Communications of the ACM* 36(12) (Dec. 1993): 17-18.