JUST FOR YOU SERVICES ON THE INFORMATION HIGHWAY

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It is a tremendous honor for me to be invited to present the Miles Conrad Lecture. As many of you know, I served as Executive Director of what was then called the National Federation of Abstracting and Indexing Services from 1974-1979, and had the great pleasure of working with many of you and with others in the information services for which you work. In fact my career in the information field began in February 1962 when, on leave from being an undergraduate at Brown University, I went to work for the American Mathematical Society in the library of Mathematical Reviews, which was then located in Providence, Rhode Island. I had the pleasure of working in science and engineering libraries at Brown University and the University of Washington, learning about how scientific and technical information is used and how it is created by academic scholars and those in industry. After a year in England, during which I worked as a consultant for NFAIS, I came to Philadelphia to work with those producing information services, leaving NFAIS in 1979 to work for the Institution of Electrical Engineers with its publishing and database divisions. This combination of both experience with producers and users of information services, which I had the great pleasure to build upon with six years in the government and with ten at the University of Pittsburgh, has provided an unusual perspective on the life cycle of information and on the field of information policy, which has become my area of specialization.

In my remarks today, I want to use this perspective to share with you some thoughts on where I think we currently are in the information services field and where I think we are going. In looking at where we are, it is always useful to reflect on where we have been. Two documents, which have become classics in our field not only describe our history, but also provide a good overview of where we are. The first is the 1976 report of the U.S. Domestic Council Committee on the Right of Privacy, National Information Policy1, which is often referred to as the "Rockefeller Report." Several key characteristics of the information intensive society in which we now live were described in this report. The following seven characteristics were identified:

   1. an exponential increase in the volume of information flow;

   2. a shrinkage of time and distance constraints upon communications;

   3. greater nationwide dependence upon information and communication services;

   4. an increase in the interdependence of previously autonomous institutions and services;

   5. onceptual changes in economic, social, and political processes induced by increased information and communications;

   6. decrease in the "time cushion" between social and technical changes and their consequences; and

   7. global shrinkage and its consequent pressures on increased international exchange.2

Sound familiar? This description is as accurate today as it was more than 20 years ago. If anything the increase in the volume of information over the Net and the interdependence of previously autonomous institutions and services, and the shrinkage of time and distance constraints upon communications and in the "time cushion" between changes and their consequences, are even greater than before. Certainly the Global Information Infrastructure (the GII or Information Highway) has increased our dependence on information and communications services and has made the world seem even smaller

than before. It is within this context that we create, manage, deliver and use an increasingly larger number of complex information services.

Traditionally the life cycle of information, especially of scientific and technical information, was seen as a flow from its creation to its dissemination (perhaps through the preliminary sharing of early versions in preprints) in a printed journal to its indexing and abstracting by a secondary service, through its further dissemination through libraries or directly to individuals or to other organizations, through its organization, management and preservation, to its use often by those who created it in the first place, completing the cycle. This model was never perfect, and there are many variations. The emergence of the World Wide Web has dramatically altered this life cycle and has created a number of challenges for all of us in the information field. Among these challenges are: (1) managing new documents which are fundamentally different from those we have managed in the past; (2) developing and learning the knowledge and skills needed to navigate on the Information Highway; and (3) creating, providing, and using the emerging "Just for You" information services. I would like to discuss these three challenges briefly this morning.

What secondary services have done successfully for so long is to identify the world's literature on a given subject or within other specified domains; provide intellectual access to the content of this literature; organize the information in ways that are useful to those interested in the literature; and provide the information in a variety of formats. The literature consists of journal articles, books, reports, patents, photographs, videotapes, audiotapes, maps, software, laws, and other material of all kinds and in all formats. For want of a better term, I refer to each of these items of material as a document, the term used more than 100 years ago by LaFontaine and Otlet3 when they envisioned an information service that would provide access from a single point to the entire universe of information sources on any given topic. These two Belgian lawyers, who founded the International Federation for Documentation (FID), were the precursors of the ideas popularized by Vannevar Bush in his famous, "As We May Think" article.4 Since the time of the Royal Society in Great Britain, indexes to scientific and technical documents, and later those of many other subjects, have been printed and later provided in electronic form.

But what is a document on the Information Highway? **Just as we never step into the same river twice, a document on the Net is never (or rarely ever) the same twice.** What was there this morning is often different this afternoon, or not there at all. A multimedia document can be altered, augmented, reduced, or deleted. In teaching a course last year on information policy with one of my colleagues, we, of course, put the syllabus on our Web page. The readings were found on the Web. As we discussed telecommunications policy, students found each new bill in Congress through the Thomas system of the Library of Congress within 24 hours after it was introduced. The syllabus changed weekly, if not daily, and discussions about policy issues continued at all hours of the day and night, incorporating links to electronic documents from the eight different countries represented by the students in the course. Drafts of policy documents being discussed by the National Information Infrastructure Advisory Council on which I was serving were circulated electronically for students to read and comment on. Links to video clips of Vice President Gore's or Secretary Brown's speeches, and to press releases from the White House or the G-7 Summit on the Information Society, were provided. The documents for the course continued to evolve long after the course officially ended and grades were turned in, and students from the course still communicate with us and with one another and share information. The whole notion of "a textbook" for a class has long been rejected for many types of courses. The "textbook" from this class continues to change and become increasingly complex, with documents in many forms and media.

If you were the editor of an information service on information policy and wanted to include the documents published electronically on the subject of information policy, what would you include and what version of each document would you include? For libraries, archives, historical societies, museums, and other cultural institutions, the challenge is even greater. What gets preserved and how? How will we document the actions of our society? How will we find what was there yesterday, much less last year? Will we have the hardware and the software to be able to read it? Will we have the documentation to get to it? How do we provide access to the intellectual content of what is there?

These new documents are not just combinations of traditional documents in different formats; they are fundamentally different publications. Indexing, abstracting, and

other information services must also find ways to manage and provide access to these new documents, as the lines between creator and user, primary and secondary service, library and archive, and other previously autonomous entities blur and, in some cases, vanish.

I think we have only begun to understand the nature of multimedia documents. In his intriguing collection of essays, *The Electronic Word*,5 Richard Lanham reminded us that an alphabet must be simple enough to be learned easily in childhood; it provides a "transparent window into conceptual thought."6 He contended that as we move from print to an electronic screen, "the fixed printed surface becomes volatile and interactive."7 The document is no longer static, but dynamic and volatile. The ability to interact with a document provides the opportunity to change the document, if not the original, then the copy the person is using. On the Net, one can often add comments, reviews, critiques, etc., to an existing document.

Each document can evolve and change, being linked to different documents, and the provenance evolving from the creation of these links creates new information, in itself. The challenges facing us in the information field relate to creating, managing, preserving and providing access to these new, complex and potentially powerful new documents.

The second challenge facing us is the need to define and acquire the knowledge and skills needed to be successful in our networked environment. I refer to these as mediacy skills.

We need to be able to explore information space; discover and learn; find and retrieve information; evaluate, organize, manage and preserve it; and create, disseminate and use it. We also must understand the ethical issues related to all of these functions so we can determine how best to protect privacy, intellectual property and freedom of expression, and to balance these with the public's right to know, the fair use rights of users, and appropriate limits on access.

I am pleased that our School of Information Sciences introduced a course on Information Ethics eight years ago, which continues to be taught and that we have a Dean's Forum on the Ethics of Information in Society, which brings in experts from many disciplines to explore ethical issues. More attention should be paid to these critical issues and to increasing our understanding of how to be ethical in our information-intensive society.

I think that the knowledge and skills vary for different media. For example, knowing how to evaluate a film or how to explore information space in the world of music is different from how to do these in the world of printed text, just as evaluating numeric data is different from interpreting written text. Mediacy for the new complex documents has not yet been defined. We are at a stage similar to that in the early 1970s, when we first taught ourselves and our users to search online.

Defining the knowledge and skills needed for the complicated and ever-changing environment of the Information Highway will not be easy, and ensuring that we all remain competent as the environment continues to change will be difficult as well. The phrase, "lifelong learning" has become hackneyed, but it does convey a sense of what will be needed to remain competitive and informed. **I think that partnerships between producers and users of information services are essential to define, teach, and learn mediacy.**

The third challenge, which builds upon the first two is to create a new kind of information service. In the 1978 A.D. Little study, *Into the Information Age* 8 (the second of the reports I noted at the beginning of my remarks), Vincent Giuliano and others described three information eras: the discipline-, mission-, and problem-oriented. They correctly described information flow, determining that societal information must be added to the traditional scientific and technical information to make information work better for society. They contended that we have moved from the era of focusing on a particular discipline, through the age of concentrating on information to meet a particular mission (such as putting a man on the moon), to the era of solving societal problems like pollution. Although information services for the first two eras will continue to be needed, they argued that this new era, building upon what was learned from the other two, will demand services to provide information that can be utilized for societal problem-solving, including the formation of public policy, decision-making, and crisis managements.9 Information from many different disciplines must be incorporated. We have certainly seen these kinds of interdisciplinary resources made available in many different formats and

through many different avenues: print, online directly through the producer, and increasingly on the Net.

Several years ago,10 I argued that we have moved into Era IV, that of customized, individualized information services. I believed that a single answer to meet the needs of an increasingly diverse population was insufficient. A single interface as in one type of printed card catalogue to a library's collection cannot fully meet the requirements of a diverse group of users of that library. Libraries, working with other information service providers, have developed many different interfaces to their collections. Similarly, many secondary services (if that term is even still valid) have, indeed, provided "Hot Topics," selected dissemination of information (SDI), or specialized services targeted to specific user groups. Over the past few years, a combination of refined knowledge about what kinds of information people want and how they want it, coupled with increasingly sophisticated, integrated, technologies, have moved us closer to the kind of services I have in mind. (Some years ago, I decided that the great musician, Fats Waller, had words of wisdom for information providers, when he wrote, "Find out what he likes, and how he likes it, and give it to him every day.") As we consider the kinds of ideal customized service we would like to provide every day, it is useful to consider the example of libraries, which are undergoing a remarkable transformation.

For thousands of years, libraries sifted through the world's publications to identify those of most potential use to their individual community, whether it was a small urban community, a university of scholars, a high school, or a corporate or other specialized group. They obtained the documents, organized them through cataloguing and classification, and provided access to them through reference services. They provided collections "Just in Case" their community needed them. Several studies indicated that a large portion (as much as 80%) of the collection was never used.

Over time, through interlibrary loan services and the use of computer networks and other technologies, libraries moved to providing documents and other information when it was needed by a specific individual no matter where the document was located, often outside the four walls of the library. This "Just in Time" service enhances the Just in Case collection, reduces costs and increases the quality of service provided.

> **Libraries have been moving toward service customized for each individual user for some time, especially those called special libraries within corporations or specialized communities. This "Just for You" service is what people have wanted all along, but the resources and technologies to provide this kind of service at a reasonable cost are not yet fully available.**

Think of the possibilities. Just as many bank machines ask if you want instructions in English or a second language, why couldn't the information service be in the preferred language of the user? If someone is visually impaired or has a different disability, why can't the service be adapted for that user? I am a "whole to part learner" who prefers a combination of text in English (although French is acceptable), with audio and video where appropriate, and numeric data displayed in charts when possible. Why can't an information service ask a few questions of the first-time user and then customize the service for that person? We could customize the same information for a high school student or a senior researcher and adapt it for the user's environment. How much will all this cost, and will each user be willing to pay? The challenges and opportunities to provide these Just for You services are enormous. I know that many of you are working toward the kinds of services envisioned. I have always been a realistic optimist. I understand that the costs of providing Just for You services could be prohibitive, but I do believe that this is the direction in which we should continue to move. Again, partnerships between providers and users of information hold the greatest promise for successful development.

I hope that this perspective on where I think information services are going in the future will raise questions in your mind and encourage discussion. NFAIS conferences have always been a stimulating environment for ideas and debates. Once again, thank you for the honor of presenting the Miles Conrad Memorial Lecture. I look forward to discussing these and other ideas with you over the rest of the conference. Thank you.

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