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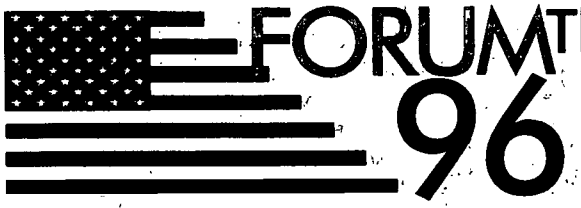
ABSTRACT

This report is a summary of topics presented at the annual forum of the Federal Library and Information Center Committee (FLICC) of the Library of Congress. The first portion of the Forum examined information availability issues and reviewed government publishing and access arrangements in the United States and other democratic countries. Significant differences in public expectations, copyright authority, official secrecy practices and technology applications were discussed. Additionally, representatives from the Government Printing Office, Office of Management and Budget and National Information Infrastructure Task Force provided an update on the status of the Federal Government's traditional information dissemination programs and described what is ahead for the next century. In the second portion, the Forum turned to interests calling for protection of information and weighed important safeguarding considerations arising due to the government's possession of expansive personal, commercial and national security information. Expert panels discussed ways to counter technological intrusion through legal enforcement and technical means and examined the vulnerability/protection issues surrounding United States information systems. A summary of the keynote address by William Drake, Assistant Professor of Communications at the University of California at San Diego, "Balancing Interest in the New Information Structure--National and Global Perspectives" is also provided, as well as the full text of Bruce W. McConnell's article, "New Wine in Old Wineskins: U.S. Government Information in a Networked World." (AEF)

A 1996 FLICC FORUM ON FEDERAL INFORMATION POLICIES



The Public's Information: Striking a Balance Between Access and Control

FEDERAL LIBRARY AND INFORMATION CENTER COMMITTEE MARCH 19, 1996 ★ LIBRARY OF CONGRESS ★ WASHINGTON, DC

The Federal Library and Information Center Committee
The Library of Congress
101 Independence Avenue SE
Washington, DC 20540-4930

1996 FLICC FORUM ON FEDERAL INFORMATION POLICIES

The Public's Information: Striking a Balance Between Access and Control

A Summary of Proceedings

LIBRARY OF CONGRESS • WASHINGTON, DC

The Federal Library and Information Center Committee (FLICC) was created in 1965 as the Federal Library Committee by joint action of the Library of Congress and the Bureau of the Budget (currently the Office of Management and Budget). FLICC is composed of the directors of the four national libraries—the Library of Congress, National Library of Medicine, National Agricultural Library, and the National Library of Education—and representatives of cabinet-level executive departments, legislative, judicial and independent federal agencies with major library programs. The Committee is chaired by the Librarian of Congress.

FLICC's purpose is to make federal library and information centers' resources more effective through professional development of employees, promotion of library and information services, and coordination of available resources. FLICC is also responsible for making recommendations on federal library and information policies, programs, and procedures to federal agencies and to others concerned with libraries and information centers.

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Susan M. Tarr

Susan M. Tarr
FLICC Executive Director

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- Emerging Issues on Managing Information Resources, February, 1984
- The International Flow of Scientific and Technical Information, February 27, 1985
- The Implementation and Implications for Information Access, February 12, 1986
- Views of a Concerned Community, February 25, 1987
- The Impact on Competitiveness, March 7, 1988
- The Congressional Initiative, March 22, 1989
- Access is the Key, March 20, 1990
- Building Information Superhighways: Supercomputing Networks and Libraries, February 15, 1991
- The Future of Government Technology: Money, Management, and Technology, March 17, 1992
- Government's Role in the Electronic Era: User Needs and Government's Response, March 25, 1993
- Information's Roles in Reinventing Government: Delivery of Government Information, March 22, 1994
- The Life Cycle of Government Information: Challenges of Electronic Innovation, March 24, 1995

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The annual FLICC Forums on Federal Information Policies are arranged under the auspices of the FLICC Education Working Group which was chaired in 1995 by Alexandra Campbell, TRADOC, Department of the Army. Each year, volunteers from the FLICC Education Working Group serve with the Ad Hoc FLICC Forum Planning Group which is composed of information experts. The Ad Hoc Working Group selects the Forum topic, identifies speakers, and helps to prepare the Forum program. FLICC wishes to express its appreciation to the FLICC Education Working Group, particularly to group member Donald Fork, Education Department; to Ad Hoc Forum Planning Group members Anne Heanue, American Library Association/Washington Office; Anna Gold, National Science Foundation; Glenn Schlarman, Office of Management and Budget; Marc Serepca, Special Library Association; Gloria Thomas, Federal Communications Commission; and Peter Young, National Commission on Libraries and Information Science; and to Library of Congress members Jane Bortnick Griffith, Lynne McCay and Harold Relyea of Congressional Research Service.

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1996 Forum Call

Advances in information technology have changed American life and commerce in revolutionary ways, but the importance of information to the underpinnings of American democracy and government remains constant.

Information about the government's operations and policy decisions helps citizens understand the rule of the law. It provides a yardstick for measuring the performance of our officials and holding them accountable for their actions. Information about the world gives us a larger context for discussing the merit of government proposals, as well as criteria for making personal and business decisions that contribute to the wealth and welfare of our nation.

For government, information defines the daily starting point for most of its functions and comprises the final output of many of its components. The Federal Government collects, uses and stores information from every segment of its vast domain—ranging from the National Weather Service and State Department to the Census Bureau and Centers for Disease Control and Prevention—from the IRS and FBI to the courts and Government Accounting Office. Burgeoning technology suggests that disseminating government information should become an easier task. Emergent budgetary constraints demand that it become more economical. The dual challenge to deliver information efficiently and economically raises a number of core questions for our democracy:

- To what extent do citizens own and control their government's information?
- What information should be controlled by the individual?
- What information should be controlled exclusively by the government?
- In navigating the territory between mandatory dissemination and absolute protection, how does government decide what information to make publicly available and what information to restrict?
- What dangers and benefits should be weighed when deciding which interests should be served?
- These questions are central to striking a balance between government information access and control and are the focus of the 1996 FLICC Forum on Federal Information Policy.

The morning portion of the Forum examines information availability issues and reviews government publishing and access arrangements in the US and other democratic countries. Significant differences in public expectations, copyright authority, official secrecy practices and technology applications will be discussed. Additionally, representatives from the Government Printing Office, Office of Management and Budget and National Information Infrastructure Task Force will provide an update on the status of the Federal Government's traditional information dissemination programs and describe what is ahead for the next century.

In the afternoon, the Forum turns to interests calling for protection of information and weighs important safeguarding considerations arising due to the government's possession of expansive personal, commercial and national security information. Expert panels will discuss ways to counter technological intrusion through legal enforcement and technical means and examine the vulnerability/protection issues surrounding US information systems.

Contents

The full text of Bruce McConnell's article *New Wine in Old Wineskins: US Government Information in a Networked World,* subsequently was published in the *Journal of Government Information*

Daniel Mulhollan, Director, Congressional Research Service, Library of Congress

Introduction

As Director of the Congressional Research Service at the Library of Congress, I welcome you to FLICC's thirteenth Forum on Federal Information Policies.

CRS is both a great consumer and producer of information. As such, the transformation to a digital world is having a significant impact on how we do our work. Technology now is employed in every aspect of our operations—from the receipt and tracking of requests, through the search for information and the analyses we prepare, to the dissemination of our products and services to the Congress.

Over the last decade, we have witnessed precipitous changes in the technologies of information retrieval and exchange. Throughout, FLICC's annual Forum has served as a meeting ground for policy makers, scholars, journalists, and representatives of private interests to gain perspective on the government's role in providing and regulating access to federal information.

From crop growth statistics to Supreme Court decisions, the federal government generates and distributes information crucial to private, public, and corporate decision makers. Recent legislation requiring agencies to make federal information available online has prompted the initiation of such projects as the Library of Congress's THOMAS. The value of this World Wide Web-based public access system of legislative and Congressional information seems obvious. However, not all federal information is so clearly useful to the public or safe to distribute freely. The new electronic communications environment has generated numerous questions:

- To whom should information be made available, and in which formats?
- What is the most economical way to provide public access to federal data?
- Which information should be kept classified in the interest of national security?
- How can agencies prevent private interests from abusing federally-held information about private citizens?

How we answer these questions will influence future federal information policies and practices.

The Forum's morning sessions will address models of public access to government information in the United States and other democratic countries. Panelists will discuss differences in public expectations, copyright authority, official secrecy practices and technology applications, and representatives from US agencies will outline various plans for the transition to electronic information delivery.

Afternoon sessions will address the protection of personal, commercial, and national security information. Panelists will discuss ways to counter technological intrusions, and to determine the appropriate boundaries for making records accessible.

It is now my great pleasure to introduce the Forum's Keynote speaker, who has devoted much of his career to examining the very issues we are here to discuss today.

William J. Drake is Assistant Professor of Communication at the University of California, San Diego. He is spending the 1995-1996 academic year in Washington, DC on a fellowship, and is also an Adjunct Professor at Georgetown University Graduate School of Business Administration.

Professor Drake received his BA in Political Science at Northwestern University, and his M.A., M.Phil, and Ph.D. in Political Science at Columbia University. He has received a number of research awards, including three years of appointments as a Visiting Fellow at the Graduate Institute of International Studies in Geneva Switzerland and at the Center for International Affairs at Harvard University.

Introduction of Keynote Speaker

He is a Research Associate of the Institute for Tele-Information at the Graduate School of Business, Columbia University; Vice President for Strategic Planning of the Global Telecommunications Society; and a member of the Editorial Board of the journal *Telecommunications Policy*. He has served as a consultant to businesses, think tanks, the United States government, and international organizations, and has spoken widely in many fora around the world.

Professor Drake's research focuses on the political economy of national and international telecommunications and information policies—particularly international regulations and technical standardization; the flow of data across borders; the Internet; and the national and global information infrastructure.

He is the editor of *The New Information Infrastructure: Strategies for U.S. Policy*, published in 1995 by the Twentieth Century Fund Press, and is currently at work on articles evaluating the Telecommunications Act of 1996, and a book on the historical evolution and contemporary transformation of the international telecommunications regime for the MIT Press.

Please welcome Dr. William J. Drake, who will be speaking about "Balancing Interest in the New Information Infrastructure: National and Global Perspectives."

Balancing Interest in the New Information Structure—National and Global Perspectives

William Drake, Assistant Professor of Communication, University of California at San Diego

"The new information infrastructure can and should be designed to balance the needs of all parties with direct stakes in it: large corporate suppliers and users, the public sector, the non-commercial sector, small and large businesses, and individual users," advised Keynote Speaker William Drake at FLICC's Annual Forum.

However, he warned audience members, conflicting interests and competing international models of information access will impede the creation of a true Global Information Infrastructure. The Internet will continue to serve this purpose, although it may change under the influence of corporate use and government regulations.

US Telecommunications History

In order to provide a context for understanding the recent Telecommunications Act, Drake offered a capsule history of telecommunications reforms in the US. He described battles over mixed use of the radio spectrum during the creation of the 1934 Telecommunications Act; over access to cable channels; and even over who could provide telephone service to the public. In each case, non-commercial interests—labor unions, church groups, educational interests, farmers' collectives—lost the option to provide service or programming to their constituents.

"Therefore, we have to think about where we are today as a turning point," said Drake. "Each model of the National Information Infrastructure has different implications."

The New Media

The recent proliferation of digital information technologies has broken down the barriers between the worlds of print, broadcasting, cable television, and telecommunications. This has led to deterioration of legislative control over crossover ownership of different media segments. Recent legislative efforts have attempted to provide guidelines for the emerging digital infrastructure. According to Drake, this new infrastructure includes:

- high capacity or broadband networks;
- data compression;
- network intelligence and flexibility;

- networked computer servers that contain digitized sounds, graphics, and text;
- interactivity;
- multimedia applications; and
- navigational tools.

"The net effect of these new technologies is an unprecedented ability to give people from all walks of life and in all sectors of the economy the ability to manipulate and utilize digital information in ways they never could before," said Drake. "So the question becomes: how best to organize it from a social and economic viewpoint in order to promote different objectives? That has been the crux of the debate over the past few years."

The Telecommunications Act of 1996

Drake credited the Clinton Administration for mapping out a model of the National Information Infrastructure which tried to balance competitive incentives for the private sector with public interest safeguards—and for opening the development process to outside influence by bringing public interest groups and the private sector into various consultative mechanisms.

He also praised the administration for promoting creative applications for information technology through initiatives such as the Telecommunications and Information Infrastructure Assistance Program, which gives grants to non-profit organizations for projects such as civic networks. "This is a very creative way to provide folks at the grassroots level with tools to scale up education, health care, and so on," said Drake.

However, he proposed, the legislative process surrounding the Telecommunications Act was very different.

"There were huge battles between the different industry sectors—telecommunications carriers, cable companies, broadcasters, and publishers—about precisely how the new legislative model would be erected and who would have access to each others' markets. That debate really dominated much of the public understanding of the whole effort," said Drake.

In the melee, the story of a broad-scale movement of non-commercial players asserting their place in the information infrastructure went unreported.

"The non-commercial sector is growing quite rapidly in the US, and there are a lot of people out there in these domains who have real and legitimate stakes in how the information infrastructure will be organized," said Drake. "Librarians, quite obviously do, as their raison d'etre is making information available to the public in a non-commercial setting. Obviously, then, if telecommunications policies are adopted which somehow restrict their ability to do so, this becomes a real issue."

Unfortunately, he suggested, this is exactly what has happened. After passage of the Telecommunications Act was blocked in the 103rd Congress, the 104th Congress hastily passed the Act after meetings which non-commercial interests were not invited to attend. The final version of the bill, according to Drake, bore little resemblance to the one proposed by the Clinton Administration.

Does the final bill balance the interests of citizens and small businesses with those of large media conglomerates?

"The general view is that the bill takes some steps in that direction," said Drake, "but it really doesn't go very far, and at the same time, greatly promotes the concentration of economic power in many of the key market segments in ways that could have deleterious effects...clearly, people in the education and library communities need to weigh with the FCC and state and local governments on issues of how universal access should be defined and implemented."

International Perspectives on Information Policy

Other countries may come to different legislative conclusions. Drake highlighted some of the disparities between information policies in the US and abroad.

He described the tone of a conference about universal access to advanced telecommunications that he had recently attended in Canada.

"Here, we tend to think of the rights of the individual as paramount, and in some senses, in opposition to the state," said Drake. "But in Canada, they don't think that way...when you speak with Canadians about how to tackle issues of universal access, they ask how to use public policy to leverage the information infrastructure to serve certain social needs."

Drake was particularly struck by Canadian businessmen's reactions to proposals that companies must provide public telecommunications services. "People were suggesting ideas that, in the American context would be considered rather regulatory," he said. Yet businessmen replied that such mandates were "part of the Canadian social contract."

"This really brought home the importance of talking about these issues in an international context," said Drake.

According to Drake, European leaders also generally hold different opinions about how to provide public information—and how much information to provide. "They don't historically have the concept of transparency that we do in the US," he said. He described the typical European approach to developing national information infrastructures as more bureaucratic and socially inclusive than the market-based US model, and suggested that the Japanese government is also very involved in the development of its national information resources.

"Everybody uses the language of exalting the market system," Drake said, "but what's really happening is that the state is heavily involved in trying to shape the way the information infrastructure is developed through regulatory mechanisms and allocation of funds."

Finally, he proposed, some countries see government information a resource to be sold. This conflicts with the American concept of government information as public property.

The resulting proliferation of American information on the Internet raises concerns about protecting national sovereignty. "People often refer to the GII (Global Information Infrastructure) as the Global Information Invasion," said Drake.

Biographical Information

William Drake, Assistant Professor of Communication at the University of California, San Diego, is on a 1995-96 fellowship in Washington, DC. He is currently writing articles evaluating the Telecommunications Act of 1996 and a book on the historical evolution and contemporary transformation of the international telecommunications regime for the MIT Press. Drake is also the editor of *The New Information Infrastructure: Strategies for US Policy*, published by Twentieth Century Fund Press; Vice-President for Strategic Planning of the Global Telecommunications Society; and a member of the Editorial Board of the journal Telecommunications Policy. Trained in political science, he has received research awards from Harvard, Columbia University, and the Graduate Institute of International Studies in Geneva to study the political economy of international telecommunications and information policies.□

Moderator: Jane Kirtley, Executive Director, The Reporters Committee for Freedom of the Press

Panelists: Robert J. Freeman, Executive Director, New York State Committee on Open Government, New York Department of State; Gail Dykstra, Director, Publisher and Government Relations, Micromedia Limited; William Drake, Assistant Professor of Communications, University of California at San Diego

Moderator Jane Kirtley offered a story "from the trenches" of the battle over public access to information rights—a case that The Reporters Committee for Freedom of the Press had been involved in Louisiana.

I. Information for the People

The East Baton Rouge Parish School Board has been fighting for over 30 years to implement a federal order to desegregate their school system. The board was ready to begin drafting a plan pursuant to a desegregation order entered by the Federal District Court in 1981. However, they wanted to avoid public protest as they embarked on their deliberations. So, the counsel for the board phoned a Federal District judge and asked for an order of confidentiality that would prohibit board members, staff, attorneys and others acting for them from speaking or writing about the draft plan. The judge issued the order without conducting a hearing or notifying any of the parties to the suit.

The newspaper and TV station in Baton Rouge promptly challenged the order—both because of the way it was issued and its content. The judge amended the order, limiting it to only the board, the superintendent, 22 staff members, and the board's attorneys, consultants, and experts. He said that while he knew that his order would prevent the press from obtaining information of significant interest, the overriding right of the children of the school district to obtain an education outweighed the public's interest in knowing how the board came up with this provision.

The US Court of Appeals for the Fifth Circuit struck down the order, as well as an order that allowed the board to meet in secret and keep secret drafts of the meeting. The court said that the order was not justified by any important government interest or countervailing individual right.

This is only one example, Kirtley explained, of the constant struggle over government information. "In this country, the First Amendment is always in the mix," she said. "It's a central underpinning to the way that democracy functions in this country, and we would be remiss if we didn't bring it up every single time that we discuss [the issues of electronic information distribution]."

Biographical Information

Jane Kirtley is Executive Director of the Reporters Committee for Freedom of the Press, an association of reporters and editors devoted to protecting the First Amendment interests of the news media. Trained at Northwestern University in journalism and Vanderbilt University in law, Kirtley has overseen the legal defense, publications, and fundraising efforts of the Reporters Committee since 1985. Kirtley writes and speaks frequently on media law issues both in the US

and abroad. She also writes "The Press and the Law" column each month for the *American Journalism Review*, and has been an adjunct professor with the American University School of Communications Graduate Program since 1989. □

Panelist Robert Freeman, Executive Director of the New York State Committee on Open Government, described his organization and provided several anecdotes about the uses of Freedom of Information Act (FOIA) laws in New York State. The Committee on Open Government was created in NY in 1974, as part of the state's Freedom Of Information Law (FOIL), to help agencies and petitioners to put the law into action. Freeman explained that he advises citizens, journalists, and corporations, and state and local government officials, on FOIA rights and obligations regardless of their political preferences.

"Our function is to suggest the right action under the law...not to agree with the government," he said.

Although the committee's opinions do not have the force of law, the organization has helped to establish a number of precedents. Freeman contended that FOIA laws work much more effectively on a local level. "Too often," he said, "the focus is on Washington...What happens if you don't like the public school lunch program? If your garbage isn't picked up? You will get in touch with your local government—City Hall, Town Hall, the Board of Education—and you will knowingly or unknowingly use access to government laws." Because of the direct contact, there is greater accountability and a greater likelihood of quick disclosure.

He explained that decisions on local FOIA cases have also made it clear that government agencies should provide information in numerous forms—on disk, as mailing labels, online—while federal FOIA court cases have not moved as quickly on this question. Gaps in federal law, such as the absence of a definition of "record," have slowed down legislation. In New York state, a record is defined as "any information kept, produced, or reproduced by or for an agency."

Freeman suggested that agencies have found it easier and cheaper to provide information on disks, often at no charge. It is less time consuming and labor intensive to transfer data from disk to disk than to have staff retrieve paper records and stand at the photocopy machine. In fact, he said, electronic media has made it so easy to provide information that "my hope is that over time the need to apply an FOIA law will diminish."

Freeman laid the responsibility for testing and maintaining FOIA laws on the shoulders of journalists. "The news media has a responsibility for guaranteeing the success of access laws—it plays a special role. If the law isn't used, it gets rusty," Freeman said. Libraries should continue to serve as "the great leveler" in terms of access to electronic information.

"Spread the information gospel!" he exhorted the audience.

Biographical Information

Robert J. Freeman has been the Executive Director of the New York State Committee on Open Government since 1976. He has spoken on open government laws and concepts to government-related organizations, bar associations, media groups, and students throughout the US, and in Canada, Japan, and Hong Kong.□

Panelist Gail Dykstra, Director of Publisher and Government Relations, Micromedia Limited, spoke about excessive restrictions on and charges for distribution of Canadian government information. She described two rights of the Canadian government: Crown Copyright & Crown Prerogative, that differ from US information policies.

Crown Copyright refers to a policy that grants copyright to the state if it publishes or pays for someone to write or research on a topic. Crown Prerogative grants the state sole right to publish certain documents. The combined force of these Crown rights allows the government to charge others for publishing government information.

Dykstra described the actual exchange of information as a matter of practice vs. perception; some materials, such as statutes, are regularly published by organizations other than the government. The publishers produce electronic versions from scratch rather than rely on government licensing policies which are unclear and capricious. Some information simply is not being privately published because governments decide that it is not worth licensing, such as electronic text of government periodicals.

One publisher had to submit 4500 Access To Information requests for information about advance rulings by the Canadian Department of National Revenue which had become important precedents. It took three full-time employees to file and keep track of the access to information requests. In another example, the federal budget in Canada takes on the force of law once it is tabled in the House of Commons and passed by Parliament. In 1995, same-day access to this information cost $500 on a diskette, $1000 for a LAN version, and a 70 percent royalty rate for online publication. Private sector publishers were forbidden to charge less, although online services had traditionally charged a fraction of these prices.

In discussions about the Internet access to government publications, the government's concerns were looking for ways to restrict access to data in order to make it more appropriate or useful to Canadians. The reaction from the Internet community pointed out that this ran counter to the principle of a free flow of information on the Internet.

Dykstra explained that these examples demonstrate that Canadian legislators structure the exchange of information between the government and the public much differently than American legislators. The Canadian government believes that only by controlling access to and the impact of information can it protect the public's need for information, the accuracy and availability of its information and serve the public well.

The Internet is helping to change some of the policies, she said, as is the concession by the government that current methods of information distribution may not be efficient. Canadian government agencies have themselves been unable to obtain access to information from one another at a reasonable cost.

Biographical Information

Gail Dykstra is Micromedia's Director of Publisher and Government Relations. Micromedia is the premier provider of Canadian government and corporate documents and directory information. Dykstra's responsibilities include acquiring rights to Canadian government, research, and periodical sources for use in Micromedia's product lines. She is active in electronic publishing organizations, and has served as Chair of the Information Technology Association of Canada's Copyright Committee and its Information Industry Council Committee on Copyright. Dykstra was previously the Senior Director of the Canadian Law Information Council's Policy and Programs, and has written two books on access to legal information.□

Moderator: Kinsey Wilson, Managing Editor, Washington Alert, *Congressional Quarterly*

Panelists: Wayne Kelley, Superintendent of Documents, Government Printing Office; Bruce McConnell, Chief, Information Policy & Technology Branch, Office of Management and Budget; Toni Carlo Bearman, Dean and Professor, School of Library and Information Science, University of Pittsburgh

II. Progress for the US Vision

Moderator Kinsey Wilson spoke about the changing models of publication in the digital age. As Managing Editor at *Congressional Quarterly*'s (*CQ*) online information service, Washington Alert, Kinsey helped to create the *CQ* American Voter '96 Home Page.

He pointed out the paradox of creating a successful Web site that cuts down on subscriptions to the printed magazine. The *CQ* marketing department suggested that the home page should limit its use of material from the magazine and other proprietary information in order to protect its subscription base.

"This battle is being played out at a lot of publishing concerns...there are those that argue that this encroachment on our franchise should be resisted at every turn," he said.

Kinsey, however, is confident that publishers will survive, as there will always be a demand for editing, analysis, searching—especially in an age of information overload. As a former reporter, he is loath to limit the dissemination of information. "Some will not survive this transition," he warned, and others will have to lower prices and seek new audiences.

"But with any luck," he said "the public will benefit."

Biographical Information

Kinsey Wilson is Managing Editor of Washington Alert—a 10-year-old proprietary online information service operated by *Congressional Quarterly* which tracks legislative affairs on Capitol Hill. As part of *CQ*'s New Media Department he has also been involved in planning various projects on the World Wide Web, including *CQ*'s Voter '96 site, and a newly launched "Vote Watch" feature on Time-Warner's Home Page, Pathfinder. Prior to joining *CQ* in December, Kinsey was a reporter and Bureau Chief for *New York Newsday*.□

Panelist Wayne Kelley noted that the rules of the federal information game are changing almost daily. "Without adequate protections," he warned, "the American public very soon will have free access to less information, not more. And what is available at a price will be more expensive."

In the print era, information was the by-product of the activities of government agencies. In the electronic era, said Kelley, it may become the reason for the government activity. He referred the audience to an article from the *Syracuse Law Review* for an analysis of this change:

"Computerization makes government information more valuable and raises the stakes in information policy debate," observed Robert Gellman, author of the article and a former chief counsel of a House Subcommittee dealing with information issues. "Information may be closely held," Gellman writes, "to avoid embarrassment, to evade oversight, to establish a function and create jobs at an agency, to develop a constituency of users, or to develop a source of revenue."

Kelley suggested that Gellman's predictions have come true. To clarify his point, he described the traditional distribution model for government information:

1. A federal agency or organization creates information of value.
2. Under the law, agencies are required to obtain their printing through the GPO. GPO then offers all government agencies an opportunity to "ride" the print order, obtaining additional copies of documents at the incremental cost of printing and binding.
3. Copies are made of all documents procured through GPO, except those which are classified or for internal agency use only. These copies are then made available to the nation's 1,400 federal depository libraries. Fifty-three regional depositories permanently retain all government documents provided.

   "That is our nation's only guarantee of continued free public access to a vast storehouse of government information." Kelley emphasized. "Nowhere else in the law is there a requirement for permanent public access to federal information."
4. Government information providing "essential evidence" of federal actions is passed by the agencies to the National Archives.

In contrast, federal agencies are now putting thousands of electronic documents on their online servers. These electronic publications are not catalogued. They may be erased or changed anytime without notice. Kelley compared this model of information distribution to a "huge government Etch-A-Sketch."

He also warned against agency partnerships with private sector publishers. "One can imagine a new model for the government," said Kelley. "Visualize, if you will, a great national forest of information, grown at taxpayer expense. Visualize a decision to turn over these valuable resources, selectively, to private firms for harvesting. Cut down all the marketable trees. Sell them back to the people who paid for them in the first place. Leave the less desirable trees to be found by the occasional hiker. And don't bother to provide any trails."

He urged agencies to consider the following principles when deciding how to distribute government information:

- The public has a right of access to government information.
- Information created or compiled by government employees, or at government expense, should remain in the public domain.
- The government has an obligation to guarantee the authenticity, integrity, and preservation of its information.
- The government has an obligation to disseminate and provide broad public access to its information.

"I would hope we still have agreement on these principles," Kelley concluded. "They have served us well for a hundred years. They should apply to the 21st Cyber Century as well."

Biographical Information

Wayne P. Kelley was named Superintendent of Documents (SuDocs) of the Government Printing Office (GPO) in 1991. The former publisher of *Congressional Quarterly*, Kelley is a journalist with more than 30 years of newspaper and magazine experience. He now heads up an operation that maintains some 12,000 Federal Government titles, distributes government documents to the nation's 1,386 Federal Depository Libraries, and oversees 23 GPO bookstores located throughout the country. In 1996, Kelley has spearheaded efforts to determine the best methods of delivering government documents electronically to citizens using the World Wide Web and local depository libraries.□

Panelist Bruce McConnell covered three topics in his discussion of the National Information Infrastructure (NII): opportunities and challenges created by information technologies, a new metaphor for NII, and the implications of the new technologies for government agencies charged with making information available to the public.

He outlined a number of new opportunities. Digital information technologies provide creators with new ways of collaborating, synthesizing, and disseminating products and distribute the power of making those products available by eliminating the need for extremely expensive equipment and physical plants. However, he warned, "there's no such thing as a free lunch. In fact these technologies create problems for sustaining information...for maintaining its currency, availability, location, and integrity."

The current library system of "just in case," and sometimes "just in time" information has advantages, he pointed out. Patrons know where to go to find works on paper, and such works maintain their integrity. However, printed materials may not be as current as electronic information, and may only be available to one patron at a time.

Although the tools for locating electronic information are constantly being improved, they are still far from perfect. "As we all know, the saying goes 'why spend an hour in the library when you can spend four hours on the Web?'" said McConnell. Similarly, maintaining the integrity and availability of different versions of an electronic document or database are still problematic.

In order to conceive the "Information Superhighway" in a different way, McConnell reasoned, we may need a new metaphor. "Information Ecology," he proposed, is a useful metaphor for a number of reasons:

- Information seems alive—it evolves and grows.
- It "lives" in its own ecological niche, and makes more sense in context and with proper support—if you put it in an "information zoo," it is not as happy.
- There is a diversity in information—just as there is a diversity in ecological systems. Similarly, information works well if it has a diversity that allows denizens to complement one another.
- Information is symbiotic—one piece of information may be unimportant by itself, but when combined with others can become more "useful."
- In the same way that we have problems with managing the ecological commons, we have trouble managing the "infosphere." There are questions of common good, capacity, and other management issues still left unanswered.

The implication of this new model, McConnell suggested, "is to assign responsibility to people in charge of sustaining information to keep it alive at the local level." While the government still has a centralized model of information distribution, the pointers and search tools that Bearman mentioned above will help to provide wider access to government information in a more timely manner. For this to work, however, the local creators must take explicit responsibility for maintaining their information, and the skills of librarians will have to change so that they can help patrons find information in this distributed environment.

It is still necessary to decide how individual sites will tie into the missions of their agencies and the government's mission of providing information to the public. Right now, there are thousands of federal Web Pages that are not governed by any standard presentation or linking rules. "There are a lot of management issues that, if left unattacked, will drive out the benefits of the former, paper-based system," McConnell concluded, "but I don't think that [the centralized distribution] model should be brought along. Rather, responsibility should be distributed." This initiative is consistent, he noted, with the NPR approach of devolving responsibility on to agencies.

Biographical Information

Bruce W. McConnell is Chief of Information Policy and Technology at the Office of Information and Regulatory Affairs, Office of Management and Budget (OMB). His office's responsibilities include oversight of the acquisition and use of information and information technology by Federal agencies, and the development of policies and guidelines to improve agency practices. McConnell represents OMB on the Government Information Technology Services Working Group (GITS), and is Chairman of the Government Information Working Group of the Information Infrastructure Task Force.□

Panelist Toni Bearman thanked federal librarians for staying in the trenches during the budget wars, shutdowns, and DC blizzard to defend libraries and access to government information.

She spoke about her involvement in the US Advisory Council on the NII. In order to develop an inclusive plan for the NII, members of the Council held public sessions around the US, fielded electronic messages, and organized meetings with various user communities. The Council itself had representatives from many different arenas, and they taught one another about different aspects of the developing technology.

"We certainly educated one another," she said. "I don't think there's a member of the council that hasn't learned a heck of a lot about libraries now."

With all of this input in place, the council moved on to educate the public about the issues surrounding information technologies. They published a number of documents, including "Common Ground", a document in which all of the council members agreed upon fundamental principles regarding such topics as universal access, privacy, intellectual property protection, and security. They also looked closely at specific application areas, such as lifelong learning, health care, public safety, emergency management, electronic commerce, and government information services. The council issued a series of reports about these applications; all of their publications are available on the Benton Foundation's Home Page (benton.org).

Bearman worked on the report about government information with Vance Opperman, President of West Publishing. "What was interesting to me," she said, "was that he and I were in agreement. Where we ran into a barrier was with people from state and local governments. We believe that the government shouldn't copyright information; we believe that the government shouldn't charge for access to that information. State and local government representatives on the council argued very strongly that they needed to have copyright to protect the integrity of their information, to recover costs, and that many state and local governments were required to recover costs by charging for services."

The council was asked to come up with a specific action item for each of the NII applications that they studied. In their report on government information, they recommended that all levels of government use information infrastructure technology to provide basic pointers to government information and services. This would simplify the use of government information, improve delivery of government services, and allow the private sector to build enhanced and expanded value-added information products and services. (Current examples include the *Federal Register*, GPO Access and the legislative calendars.) They were very explicit in stating that the information should neither be copyrighted nor charged for.

The council also developed a kick-start initiative to connect libraries, schools, and community centers to the Internet. In their report, they outline the benefits of connecting to the Internet, but tell readers that there is no magic formula for connecting to the NII. "The most important thing is for each local community to decide how best to get involved in the information infrastructure," Bearman said. The report offers suggestions; outlines stakeholders and strategies to attract

champions for connection; and provides success stories gleaned from around the country. The report also provides a resource on intellectual property, with suggestions and scenarios for the use of teachers and students. Similarly, there is a section on privacy and security.

The council agreed that it would leave a legacy. They have proposed to set up a clearinghouse of success stories. Each member of the council also agreed to carry forth a personal legacy. Bearman is working at her local and state levels to set up a Pennsylvania information highway.

"I think it's important for each of us to work within our local communities, within our public libraries, schools, and community centers to make sure that they get connected. That means helping them get the champions, helping to get contributions of hardware and connections, doing the communications and training...The only way this is going to work is if you people in the room are heavily involved from the beginning," Bearman said. "I hope that all of you will join me in that effort."

Biographical Information

Toni Carbo Bearman has been the Dean of the School of Library and Information Science at the University of Pittsburgh since 1986. For the previous six years, she was Executive Director of the U.S. National Commission on Libraries and Information Science (NCLIS). Bearman is a member of the US Advisory Council on the NII and was named a US Representative to the 1995 G-7 Round Table of Business Leaders to the G-7 Information Society Conference in Brussels, Belgium. She has been extensively involved in planning committees and professional organizations, notably as Vice-Chair of the US National Committee for the International Federation for Information and Documentation and as President of the American Society for Information Science. Author of more than 100 articles, speeches, and technical reports, she is also Editor of *The International Information and Library Review* (IILR), published by Academic Press.□

Moderator: Priscilla Regan, Associate Professor, Department of Public and International Affairs, George Mason University

Panelists: Gary Marx, Professor, Department of Sociology, University of Colorado; Mark Rotenberg, Director, Electronic Privacy Information Center; Lance Hoffman, Director, Institute for Computer and Telecommunications; Systems Policy, The George Washington University

Moderator Priscilla Regan introduced the day's third session, entitled "Protecting Personal Information."

"Questions of balance, access, and control have become particularly important in policy debates," said Regan. She suggested that in the last 30 years of privacy policy debates the balance of access to information has often been struck in favor of organizations rather than private citizens.

III. Protecting Personal Information

Debates about information privacy have been focused on who has access to important personal information. Who should have authority to search through personnel, criminal history, or medical files? "The answer to this question involves the last term...control," Regan noted. "From an information privacy perspective, the individual should have control."

She explained that US privacy legislation addresses the issue of personal control of information by appealing to principles of fair use. These principles include the individual's right to see and correct information in his/her file, and the promise that information collected for one purpose should not be used for another purpose without the individual's consent.

These principles were developed in the early 1970's. "Since then," said Regan, "the challenge of protecting personal information has become ever more important."

Biographical Information

Priscilla Regan is an Associate Professor of Government and Politics in the Department of Public and International Affairs at George Mason University. Prior to 1989, she was a Senior Analyst at the Congressional Office of Technology Assessment. Her primary area of research involves the development of technological changes—especially communication and information technologies—and their effects on society. Regan is the author of *Legislating Privacy: Technology, Social Values, and Public Policy*, published by the University of North Carolina Press. She is on the advisory board of Privacy and American Business, and the editorial board of the *Journal of Media Law and Practice*.□

Panelist Gary Marx advised librarians to consider the "whys" as well as the "hows" of information technology.

"The technologies for collecting personal information transcend the physical and liberty-enhancing limitations of the old means," he warned. "They transcend barriers—some of them are walls, some distance, some darkness, some skin, some time. All of these in the past have given integrity to the self and the social system; they're now much more porous. We're a transparent society of record, such that documentation of our past history, current identity, location, physiological and psychological states, and behavior is increasingly possible."

As providers of information and access, said Marx, librarians should be aware that the ability to collect information is not equitably distributed and that information can be collected without an individual's knowledge or will.

He described ways in which information collection technologies can produce value where none previously existed. "To be alive and a social being means we automatically give off constant signals of information, whether in the form of heat, of pressure, motion, brain waves, perspiration, cells, sound, olifactors, waste matter or garbage, as well as the more familiar forms like communication or visible behavior," Marx explained. "We are just reeking, and now the technology is there to gather the information and make sense of it."

New methods of gathering such information expose individuals to unprecedented levels of surveillance, control, and pre-screening. Marx enumerated several emerging technologies which may threaten current boundaries of personal privacy:

- DNA profiles may some day be used to screen for illness, a tendency towards alcoholism, homosexuality, or poor work habits.
- "Intelligent highway systems," or vehicle tracking devices, might some day slow your car down because you're going too fast, or sample the air that you're breathing and stop the car if your blood alcohol level is too high. Such systems may also make it possible to charge drivers for traveling to different destinations.
- Chips can be implanted in your pets to track them through a satellite system. This technology could also be used to track your child, or convicted felons.
- Smart cards have been proposed which hold individual health records. This change in format could make health information more accessible to potential employers, insurers, and landlords.
- Commercial use of spy satellites could produce photographs within one square meter or smaller of a specified area.
- Smart image recognition systems could permit the computer matching of faces in large crowds or on the Metro.
- A phone number may be assigned at birth which would allow us to be reached anywhere.

"Who needs privacy?" Marx asked. "Isn't it the case that only people who have done something wrong should be worried about it? Don't people have a right to knowledge?"

He presented a number of reasons for protecting privacy:

- Control of personal information is related to personal dignity; totalitarianism and prison are both defined by a lack of respect for control of personal information.
- When your privacy is protected it can be socially useful, encouraging honesty, risk-taking, experimentation, and creativity.
- Doctors and attorneys should retain confidentiality in order to improve the flow of information.
- Privacy is a resource in interpersonal relationships; space is needed for the formation of friendships and the gradual building of intimacy.
- Strategic resources in impersonal relationships, such as trade secrets, are crucial for industry and government.
- People should be allowed to move and make a fresh start.
- Privacy promotes fairness; it prevents discrimination for illegitimate reasons.
- Privacy provides the solitude and peace required in a dynamic society.
- Secrets are vital for individualism, which is central to our society.

"The mark of a civilization may be seen in the way it protects personal privacy," added Marx. In closing, he offered the following rules for protecting privacy:

- Subjects should be informed and consenting.
- Information collection should be minimized.
- If you alter the privacy status quo with a new technology, offer a means of restoring it.
- There should be a safety net for privacy that people cannot fall below.
- Data should be timely, valid, and relevant.
- There should be policies reviewing how and for how long data is kept.
- There should be joint ownership of transactional data.

"There's no guarantee that hard-won conceptions that we hold—the dignity of the person, autonomy of organizations, the rights of citizenship—will be upheld in the face of continual social and technological change absent knowledge, wisdom, and vigilance," Marx concluded.

Biographical Information

Gary Marx is Professor and Chair of the Sociology Department at the University of Colorado at Boulder and director of the Center for the Social Study of Information Technology. He is Professor Emeritus from MIT, and the author of *Protest and Prejudice, Undercover: Police Surveillance in America, Collective Behavior and Social Movements* (with Doug McAdam) and editor of *Racial Conflict, Muckraking Sociology*, and other books. He is currently working on books on new forms of surveillance and social control across borders. His work has appeared or been reprinted in over 175 books and he has written articles for numerous academic journals, as well as popular magazines, newspapers, and encyclope-

dias. He has served as a consultant or panelist for several national commissions, the House Committee on the Judiciary, the Senate Labor and Human Resources Committee, the General Accounting Office, the Office of Technology Assessment, the Justice Department, the Canadian House of Commons, the National Academy of Sciences, SSRC, public interest groups, foundations, and think tanks.□

Panelist Mark Rotenberg questioned the need to balance access to and control of information. Instead, he suggested that both principles must be supported in order for either one to succeed. As evidence, he noted the passage of the Privacy Act of 1974 and the strengthening of FOIA in the same year by the same Congress.

"These are two pillars of information policy for the US government," said Rotenberg. "One makes a very strong statement about the rights of citizens to have their personal files protected; the other very clearly upholds the government's obligation to make records available to the public....Was the Congress particularly schizophrenic? I think the better way to make sense of this is to see the two rights as complementary. In an open society, government has the responsibility to both protect the privacy of citizens and to make government actions public."

Rotenberg asked the audience to compare the rights of access, privacy and speech in a totalitarian or prison society to the same rights in an open or democratic society.

"When a democratic society operates as it should, it will respect the dignity of the citizen in private life and promote active public debate," said Rotenberg. However, he warned, current trends present enormous challenges to speech and privacy rights in the United States. He outlined three of these challenges:

The Communications Decency Act of 1996—This act would impose broad sanctions on Website operators who provide information classified as "indecent" to minors. Legislators have suggested that Website operators ask all users for identification to confirm age. "I hope that you, coming from a library background, understand what the significance of this development would be," said Rotenberg. "One consequence would be to simply shut the doors on young people seeking to use the Internet to get information...I think this is directly contrary to principles of intellectual freedom and open access."

Regulation of technologies of privacy—These technologies include both encryption and technologies which allow for the anonymous exchange of money for goods or services. Cash exchanges are the most widespread anonymous transactions; current examples of anonymous electronic exchanges include Metro tickets or copy cards.

"It turns out that the Internet is a wonderful platform to promote these types of exchanges," said Rotenberg, "but not surprisingly, with the opportunity to have this type of extension of the privacy protection exchange in the online environment, law enforcement agencies are expressing a great deal of concern."

Because of fears about encrypted messages which communicate criminal intent, anonymous money laundering, and tax evasion, the US has moved to restrict the development and export of technologies of privacy. In contrast, the European Union is supporting their development.

"I think we face a great challenge in trying to hold off efforts of government to regulate technologies of privacy," said Rotenberg, " because for the first time, with technology, we can begin to recapture some of the loss of control over personal information and to break what has become the unstated premise that as technology evolves, privacy must be lost."

The commodification of personal identity as defined by Rotenberg is "the aggregation, refinement, and use of personal data without the individual's consent in the commercial sphere for market-driven purposes."

He described the catalog used by the direct marketing industry, which advertises lists of people classified by hundreds of different factors. "All of this data is collected and sold, invariably without the knowledge of the people involved," Rotenberg said. "I do not see where the First Amendment interest in that industry lies...I think our challenge is going to be to re-establish the right for people to control the commercial value of their own identity. We have two good guiding principles; whether we succeed in preserving those principles remains to be seen."

Biographical Information

Marc Rotenberg is Director of the Electronic Privacy Information Center (epic.org) in Washington DC, and the head of the Public Policy office of the Association for Computing (acm.org). He is also an Adjunct Professor at Georgetown University Law Center where he teaches information privacy law. Previously, Rotenberg served as counsel to the Senate Judiciary Committee, specializing in law and technology. He has testified before Congress on many cyberspace issues, including access to information, computer crime, and privacy. He is a graduate of Harvard College and Stanford Law School.□

Panelist Lance Hoffman offered a summary of technological approaches for preserving privacy.

He described computer security as "a kitbag of technological safeguards and managerial procedures which can be applied to computer hardware, programs, and data to assure that organizational assets and individual privacy are protected."

Typical threats to users of computers and online systems include unauthorized disclosure, destruction or modification of data and denial of service. "All of these are very easy to do right now," said Hoffman. "We're building computers without seatbelts, and are seeing the electronic equivalent of people being thrown hurtling out of the car."

Many groups are working on methods to secure computer systems. Identification "cards" which can be inserted into CPU slots; authentication devices such as passwords, biometrics, and tokens, and a more narrow definition of authorization privileges may all be used as safeguards.

Hoffman praised recent efforts to create anonymous transaction technologies, but warned that they do indeed allow for "the perfect crime."

"There are balancing issues we have to deal with," he said. "They're not going to be easy, but they're going to be there."

He outlined the relative advantages and disadvantages of working within networks. On the plus side:

- Users can share resources.
- Users can access services such as electronic mail.
- The organization's maintenance and storage costs may be reduced.
- System reliability may be increased.
- Workload may be shifted from a heavily loaded system to an underutilized system.
- Networks may easily be expanded by adding new nodes.

However, possible network security problems include:

- access by unknown users in unknown places;
- complex network operating systems;
- messages routing through many points of attack;
- high data integrity risks, including the risks of modification, deletion, replay, reordering, and insertion of bogus messages;
- and a lack of a central authority to administer the system.

In closing, Hoffman discussed encryption methods and applications. "We have the technical means for encryption," he warned, "but no policy solutions." He predicted that struggles over privacy and the rights of law enforcement officials would result in a long wait for resolution of computer security issues.

Biographical Information

Lance Hoffman is a Professor of Electrical Engineering and Computer Science at The George Washington University and Director of the School of Engineering's Cyberspace Policy Institute. Known for his pioneering research on computer security and risk analysis, Hoffman has headed cryptographic policy projects for the Software Publishers Association and the National Institute of Standards and Technology. The author and editor of numerous books and articles on computer security and privacy, Hoffman has lectured around the world on the vulnerability of society to attacks on computer systems.□

Moderator: Harold Relyea, Specialist in American National Government, Congressional Research Service, Library of Congress

Panelists: Eric Biel, Staff Director, Committee on Protecting and Reducing Government Secrecy; Robert D. Steele, Chairman and Chief Executive Officer, Open Source Solution Group; Joan Winston, Principal Policy Analyst, Trusted Information Systems, Inc.

IV. Several Systems & Classified Content

Moderator Harold Relyea moderated the day's final panel, which examined changes in classification and security procedures for government information.

"While we recognize that we have certain types of classification policies in place, and while we have certain techniques for protecting information to reinforce those policy systems, there are questions about the adequacy of these systems," observed Relyea.

One reason for re-examining the security of classified documents is the drive toward electronic formats. "No longer can we depend on the locked file cabinet," Relyea said. "Information previously maintained in paper form is now maintained in a computer. This may allow someone can get to it, 'hack' it, and do all kinds of things to it other than just stealing it."

A second consideration is the push to scale back the administrative costs associated with security classification now that the threat of the Cold War has receded.

"We're scaling back at a time when we should perhaps be looking forward to some of the new threats," cautioned Relyea. "Terrorism no longer comes out of the barrel of a gun; it may come out of fingers on a keyboard."

He suggested that there have been some attempts to address these issues. The Clinton administration recently revised the security classification directive and overhauled the personnel security system. A report on changes in the information security system at the Department of Energy was also recently completed. A few years ago there was an overhaul by a joint security committee of information security within the intelligence community.

However, said Relyea, "most of these initiatives were directed at shaking down resources." He advised policy makers to examine issues other than funding when retooling security classification policies.

Biographical Information

Harold Relyea has been a Senior Public Policy Analyst with the Library of Congress Congressional Research Service since 1971. In addition to his CRS duties, which include responsibility for research into various aspects of government information policy and practice, Relyea has authored over 150 articles for scholarly and professional publications in the US and abroad. His most recent books are *Silencing Science: National Security Controls* and *Scientific Communication and Federal Information Policies in the 1990's.*□

Panelist Eric Biel described the formation and activities of the Commission on Protecting and Reducing Government Secrecy, established by the Foreign Relations Authorization Act for FY94-95 as a result of legislation introduced by Senator Daniel Patrick Moynihan (D-NY).

The purpose of this bipartisan commission is to establish proposals designed "to reduce the volume of information classified and thereby to strengthen the protection of legitimately classified information." It is also exploring issues of personnel security and information technology security.

The commission's twelve members were selected from both the government and private sectors by President Clinton and the Republican and Democratic leadership of the House and Senate. Commission staff members include specialists detailed from the Department of State, the Department of Defense, the Central Intelligence Agency, and the National Security Agency.

Biel explained that Senator Moynihan was initially interested in speeding up the declassification of historical records. NARA alone has between one-half billion and three quarters of a billion pages of information awaiting declassification. Executive Order 12958, issued in April of 1995, provides the impetus for increased declassification; one role of this commission is to monitor the implementation of this new Executive Order.

In addition, the commissioners asked the staff to examine what Biel calls "the front end of the process," the practices that lead to the classification of information. Many new documents are automatically classified; in 1995 this led to the production of approximately 4.8 million new "secrets."

"Basically, we can think of this as a form of regulation," said Biel. "In the current climate of deregulation we need to understand that classification shouldn't be off limits simply because it is related to national security."

By examining the classification and security systems and the bureaucratic "culture" and costs associated with them, the commission hopes to streamline government security policies.

"We really intend to try to begin at the beginning and try to think how this system should be organized in 1996 rather than what elements of a system organized around 1946-47 should remain in place," Biel said. He then outlined four issues relating to the rapid development of new information technologies:

- How is the federal government organized to address protection issues? Why have there been heated organizational battles which created obstacles to developing an integrated approach to information security issues?
- How do approaches to protecting information differ in the classified world from those of other organizations (both governmental and private)? Are there methods of securing information other than the formal classification system that the government could adopt?
- What is really meant by the term "risk management"? Should agencies practice "risk management" rather than the "risk avoidance" methods developed in the Cold War era?
- How can some of the emerging technologies assist in streamlining classification management and facilitate declassification?

The commission has conducted several public hearings and "roundtable" discussions concerning classification, declassification, and security issues. Views on these topics have been solicited from government officials, industry representatives, scientists, historians and archivists, journalists, and other interested persons. Biel concluded his presentation by encouraging federal librarians and information center staff to provide their input on classification issues to the commission.

Biographical Information

Eric R. Biel is the Staff Director of the Commission on Protecting and Reducing Government Secrecy. Biel previously served as an International Trade counsel for the US Senate Committee on Finance and worked at the Washington DC law firms Mayer, Brown & Platt and Arnold & Porter. He received his J.D. from Yale Law School and an M.P.A. from Princeton University's Woodrow Wilson School.□

Panelist Robert David Steele spoke about the vulnerability of the nation to information warfare.

In the course of his 18-year career in national and defense intelligence, Steele's experience with covert intelligence operations convinced him that intelligence strategies should be restructured to better utilize open sources.

"I tell people not to send a spy where a librarian should go," said Steele. "We have this magnificent information continuum: schools, universities, libraries, information brokers, businesses, government, defense, the media. There's a vast wealth of knowledge, but it is not yet an information commons, because we have iron curtains between the sectors, bamboo curtains between the institutions, and plastic curtains between the individuals in each institution."

According to Steele, openness has triumphed over secrecy. The secrecy practiced in the mid-twentieth century blocked technological development and led to the duplication of information. As an example, he asked the audience to compare the development of the nuclear industry with the recent growth in the consumer electronics industry. The cost of secrecy, he suggested, is enormous.

He criticized the lack of a national information strategy, and the lack of Chief Information Officers for agencies. He warned the audience against a classified electronic threat—against state, corporate, and individual information warfare. "It is not safe to work and play in cyberspace," he said. "There is no accountability in this nation for providing secure communication and computation paths."

He called the clipper chip "an insane idea, a way of substituting bad law for bad engineering. NSA has got to get back in the business of learning to deal with new threats and not trying to retard technology. The encryption monster is out of the bag, and in fact, it's good for the public."

Steele also criticized the lack of information security in business. Corporations don't want to know about security problems, he suggested, because they don't want to be liable for the consequences. As a result, important communications networks, power grids, financial centers, and street lights are all vulnerable.

"I could take this country down in 24 hours with a platoon of people," said Steele. "We have an extremely fragile technosphere at the very time we are creating an alienated Luddite population, at the very time that we have transnational gangs...not having a national information strategy which provides for connectivity, content, and coordination of security standards is tantamount to not having a nuclear deterrent during the Cold War."

In the age of information, he concluded, content is the most valuable commodity. It is therefore absolutely imperative that nation establish an information strategy in order to protect both military and domestic content from "an electronic Chernobyl."

"Hackers are a national resource," said Steele, "because they're telling us that the emperor is naked."

Biographical Information

Robert D. Steele is the founding Chairman and CEO of OPEN SOURCE SOLUTIONS GROUP. After an 18-year career in national and defense intelligence Steele became a consultant and advocate for information strategies which harness the full range of private sector capabilities, and a noted commentator on information warfare. He has been the senior civilian responsible for establishing a new national intelligence production facility, the Marine Corps Intelligence Center.□

Panelist Joan Winston addressed information security and privacy concerns in our increasingly networked society.

"Cryptography plays a key role in policy debates," Winston explained. "Although it used to be mostly a 'government technology,' shrouded in secrecy, it is now also a commercial technology of great importance to the development of the global information infrastructure and to the competitiveness of computer hardware and software companies in the global marketplace."

Winston suggested that the application of cryptography to electronic information upsets the balance of information flow between the government and private entities. She cited the Communications Assistance to Law Enforcement Act as an illuminating example.

The Act was an attempt to enact legislation to preserve government wiretap access in the face of law enforcement concerns over the consequences of digital telephony. However, it could not guard against the encryption of the intercepted information.

"Use of encryption and decryption can decouple—and rejoin—information access and intelligibility in a far more efficient, powerful, and pervasive way than ever was possible in an analog or paper based world," said Winston. As a result, she said, cryptography policy issues have become "front page news."

Once thought to be an arcane science, cryptography is entering the lives of everyday Americans as they send email, use software programs, and make banking transactions.

"The time has come," said Winston, "when cryptography policy needs to reflect a different balance among competing interests—national security and law enforcement, to be sure, but also individual privacy and civil liberties concerns, and business and economic concerns."

She explained that many of the ongoing debates—including discussion of the "clipper" chip—revolve around questions of import and export. The government is facing an internal tension between promoting widespread access to security technologies for citizens and businesses using the global information infrastructure and controlling access to those security technologies so that US signals intelligence and law enforcement capabilities will not be hampered.

The current Executive Branch approach to these tensions was laid out in the 1993 KeyEscrow Encryption initiative and the Clinton Administration's August 1995 policy announcement that commercial encryption products which include suitable key escrowing could be exported under Commerce Department jurisdiction. Winston summarized the key goals of bills that have been introduced in the House and Senate in response to Clinton's policy announcement:

- To prohibit restrictions on domestic use and sale of encryption (no mandatory key escrow);
- To criminalize use of encryption in furtherance of a crime, to obstruct justice;
- To establish "due form" and "due process" for government access to decryption keys, establish key holder obligations and immunities;
- To relax export controls, move commercial cryptography products to Commerce jurisdiction and use a commercial availability standard.

"How this will play out will make for 'interesting times' over the next few months before the election," concluded Winston.

Biographical Information

Joan Winston is Director, Policy Analysis, at Trusted Information Systems, Inc. (TIS). Her work involves cryptography policy and export issues related to TIS's family of key recovery technologies. Before joining TIS, Winston was a Senior Associate at the Office of Technology Assessment (OTA), where she directed studies on information security and privacy in network environments and on computer software and intellectual property. Winston earned both a B.S. in Physics and an M.S. in Technology and Policy from MIT.□

Speaker Spotlight

New Wine in Old Wineskins:

US Government Information in a Networked World

Bruce W. McConnell*, Chief, Information Policy and Technology, Office of Information and Regulatory Affairs, US Office of Management and Budget

Subsequently published in *Journal of Government Information*

*The views set forth are those of the author, and do not necessarily represent those of the Office of Management and Budget.

Abstract

Electronic information transforms relationships among the elements of traditional publishing, creating new opportunities and new challenges, especially for the long-term sustainability of information. The most prevalent popular metaphor, the information highway, is somewhat misleading. A new model—information ecology—can bring new thinking to bear on these challenges. Exploring this model suggests that current government information dissemination institutions and practices must transform themselves if access to valuable public information is to be maintained and expanded.

The Impact of Electronic Information

History teaches that change breaks the old while creating the new. Sometimes old institutions are unable to contain new activity, just as old wineskins filled with new wine will burst, and both wine and skins be lost. Those used to drinking the old wine may be uncomfortable trying the new. (Luke 5:33-39) Electronic information is new wine. Today's information is contained by, and flows from, fine institutions which continue to serve public good but face an uncertain future. Electronic information presents new opportunities and new challenges with respect to keeping the public informed about government activities and providing and maintaining economically important government information.

New Opportunities in Dissemination

Information dissemination requires a combination of activities, including creation, editing, production, marketing, and distribution (1). Electronically-networked information is transforming the relationship among these activities. In the paper world, the economics of manufacturing technology bind the individual creator to a publisher, who is responsible for editing, production, marketing, and distribution. Information technology breaks that bond, creates different roles, and broadens participation.

Networked information technology today supports electronic mail, file transfer, and the services of the World Wide Web. The transforming effect of these services on organizations and work processes, widely documented in anecdote, remains poorly understood from a systematic perspective. In the sphere of information dissemination, the immediate impacts of the technology are to open up the creative process, permit the disaggregation of post-creation value-added activities, and flatten the distribution structure.

New Challenges for Sustaining Information

The creative process is opened up by the ability to share preliminary work easily, to draw on a broad range of resources, both human and electronic, and to produce successive revisions quickly. Creation can extend to collaboration with the ultimate consumer, permitting "mass customization," the tailoring of each consumer's version of a product to his or her own tastes (2). The skills required for creation become more diverse (e.g., facility with specialized software), and responsibility for editing can migrate upstream to the creator. (3).

As a work proceeds from creation through the activities presently associated with publishing, creators can choose to do more themselves, or to engage in a variety of new collaborators. Posting one's work to a moderated newsgroup or maintaining one's own Website are viable alternatives to traditional publication. The more specialized of these activities (e.g., representing the author in intellectual property negotiations) may continue to benefit from economies of scale or scope from being performed centrally (4).

The effect on distribution is the greatest power of the technology, and the one least understood. Final production and distribution of "copies" becomes extremely inexpensive. The technology's support for interactivity breaks the mold of one to many publishing. As one industry leader envisions, "If there is a market for 500 channels, imagine the market for 5 million, 50 million, 500 million!" (5). But this proliferation of sources and outlets raises issues about the present and continued quality of information.

Once created and distributed, electronic information products must be sustained if they are to retain their value. Sustaining includes maintaining the information's currency, availability, location, and integrity. Currency means keeping it up to date. Currency is complemented by availability—the retention and preservation of information for future users. Both require the ability to locate the information and to validate its integrity.

The present system works well for availability and integrity, fairly well for location, and poorly for currency. Libraries serve as public archives to retain and preserve published works, though increasingly challenged by the costs of cataloging and shelving growing collections and by the problem of deteriorating acid-based paper in works produced since 1850. Regulations govern the retention and preservation of business and governmental records. Paper is intrinsically hardened against tampering. It can easily be imbued with evidence of its authenticity, attested to by bindings, seals, or signatures. But, rapidly changing information is soon out of date, and updating is resource-intensive. Finally, locating paper information is not always easy. Here the technology is assisting—for example the Government Information Locator Service (GILS) provides an online catalog of government information products, both paper and electronic (6).

While information technology can improve location and currency, present automated tools do not yet provide or maintain availability and integrity very well. Search tools make information easier to find. The ease of replacing out-of-date information with the latest version is a double-edged sword; it is not always obvious where one goes to find the previous version. As for availability, technological obsolescence in this rapidly changing industry makes acid-based paper seem like a simple problem (7).

Technology can increase the ease and effectiveness of peer review. Ultimately the integrity of electronic works will best be assured by getting them directly from reputable sources. For the most important documents, the so-called digital signature will provide ironclad assurance. But the institutional infrastructure to support digital signature services, like many Websites, is still "under consideration" (8).

Taught By a New Metaphor

Meeting the challenges created by networked information will require new ideas. Often when looking ahead into the unknown it is useful to employ metaphor as an analytical tool, to permit reasoning from the familiar. The image of wine and wineskins, or of breaking eggs to make an omelet, each impart different aspects of the disruptive nature of progress. Any metaphor has its limits, however.

The Information Superhighway

In the present context, the dominant metaphor is overripe. Potholes, detours, on ramps, under construction, the rules of the road, and other derivative images have served their purpose fully, at least for serious thinking. The image, beneficially concrete, compelling to a nation of motorists, will remain, perhaps forever, in the popular mind. Its grossest liability is the mistaken impression it gives that government will fund the highway's development, for in the U.S. the private sector will continue to design, build, own, and operate the information infrastructure. The metaphor intimidates by evoking speed, dirt, noise, and danger. But it misleads in more subtle ways.

The highway metaphor emphasizes *the auto-mobility* of users. It evokes no common journey. Each person travels to his or her own destination. Television may be the analog of mass transit, but a parking lot is no community (9).

Networks are concurrent. Internet Relay Chat (10) is the most extreme version of concurrent, shared experience on the net, but email lists work at least as well (11). Collaboration among individual creators and senders does not flow from the metaphor.

Information is local. Creators have always been local, but today, even faxes do not send the original. Online, physical location is no longer meaningful. And offline resources are not on the highway, yet they remain the most important information sources for many of us. A more organic image is needed to assist in thinking about information management.

Information Ecology

As much as those in the information business think highly of information, its value pales in comparison with the object of ecology, life itself. Approached carefully, however, the notion of an "information ecology" instructs. It is not a new idea. Biologist Edward O. Wilson hints at the metaphor from the parent discipline:

"Each ecosystem has intrinsic value. Just as a country treasures its finite historical episodes, classic books, works of art, and other measures of national greatness, it should learn to treasure its unique and finite ecosystems, resonant to a sense of time and place." (12)

Going further, John Perry Barlow argues "Information is a life form." Information forms patterns that "evolve to fill the empty niches of their local environments...the surrounding belief systems and cultures of their hosts, namely, us." (13). Others go beyond metaphor (14).

The thesis of this article is that information is most usefully created and sustained in its own niche, connected and interdependent with other information. Cybernetics considers natural systems to be "wholes whose specific structures arise from the interactions and interdependence of their parts...and the nature of the whole is always different from the mere sum of its parts." Following this thought, "deep ecology" asserts that the world is not a "collection of isolated objects but rather...a network of phenomena that are fundamentally interconnected." (15). Of course natural ecology is for better understood and more mature as a discipline than information ecology (16).

Nevertheless, thinking about information as an element of an ecosystem immediately enables one to draw upon the importance of diversity in living systems. There is a redundancy in healthy natural ecosystems that permits survival under stress. Likewise, healthy information systems exhibit redundant pathways and resources, so that there is no single point of failure. Resources reside in multiple locations and are sustained there (17).

A second implication of information ecology is complementary information. Like symbiotic organisms, many kinds of information are lifeless without other, complementary kinds. Raw government economic statistics, for example, may be nourishing tidbits, but without the analytical engines of academia and business to adduce trends and provide context, they make a meager meal. Conversely, the derivative works of business and academia depend on government information as raw material. Moreover, the analysis and conclusions contained in those works inform government as to the most appropriate directions to take its products (and, in the best case, policies) in the future. Such complementary information can be critical to progress. Although laser technology was developed in the early 1960s, the know-how to produce high quality optical fibers—and thus enable fiber optic networks—did not emerge until the 1980s (18).

Finally, information ecology permits consideration of the "problem of the commons" that plagues our information space (19). Spamming and piracy pollute the system. The challenges we face in managing and sustaining "public good" information cry for attention. Though a light hand is needed given the complexity and culture of the net, one may today be reminded of Odysseus; the Sirens call, but truly No-Man manages the infosphere.

Managing the Commons

How then should the information commons be managed? More accurately, given an insight into its eco-nature, what is the best way of guiding it together? Three tenets may serve: distribute responsibility, cultivate intermediaries, and use the technology.

Responsibility for managing the infosphere must begin at the information. No single mind or machine can comprehend the universe of knowledge. Instead, centers of excellence and expertise—subject-oriented, client-oriented, regional—should reside in an environment that lets these centers build on their strengths and fill in their places in the network. For this method to work, standards may be needed—standards of diligence, quality, and presentation. Community standards have long existed for newspapers—no ads on the front page, for instance. But as the editor of *The Washington Post*'s online service "Digital Ink" observed recently, no such standards exist for electronic newspapers, and the Post's marketing strategy involves ready links to advertisers relevant to particu-

lar news stories (20). The government faces the same issue—proliferating home pages (several hundred at last count) and no standards of appearance or content. (OMB is working on this.)

Distributed responsibility can sustain information. In a thorough and groundbreaking analysis, a broad-based task force of information professionals has examined the concept of a national system of digital archives. The proposal envisions a distributed storage environment based in centers of excellence. Each archive would be supported by contractual arrangements with suppliers, so that even these distributed centers would not physically (or even electronically) store all the works for which they were responsible. The model compares favorably from a cost standpoint with depository libraries. Each archive would meet or exceed standards and criteria set by an independently-administered program for archival certification (21).

Much is made of the democratizing force of information technology. Fax machines and email have played an important role in bringing international support to popular struggles for democratization in China and Eastern Europe (22). The communication and egalitarian potential of the net is important. Yet ecosystems are not flat. Seekers of information in context will, for the foreseeable future, benefit from the services of intermediaries.

San Francisco librarian Carl Fleishauer once remarked to the effect that libraries need to shift from building collections to making connections. Of course, librarians have always been the connection between the public and the vast stores of information in their care. This role will only be heightened as information continues to explode into the net. The same model applies in the for-profit world. Esther Dyson argues that successful information suppliers will focus not on content, but on relationships—"selecting, classifying, rating, interpreting, and customizing content for specific customer needs" (23).

Finally, the technology contains within it the seeds of its own management. The scientific research community, earliest adopter of the Internet, is now attacking large information management problems collectively. As part of the massive Human Genome project, GenBank, a public, electronic repository, lets scientists compare new genetic sequence data against its Web-resident database of known genes. Receiving 12,500 hits a day, it is faster and easier than email and more up to date than any traditional source (24).

Academic journals are following the trend—by economic necessity. McGraw-Hill, the publishing and information services company, is creating electronic academic journals that can be published more quickly and economically than traditional journals. The firm also offers academics the ability to create their own textbooks in 16 disciplines by choosing chapters and adding their own class notes. Presently the firm prints and binds the selections within two days, but it is considering partnering with universities to create regional printing centers. Chairman Joseph Dionne believes that 'within 10 years most college publishing will be a service business where we download streams of digits and they can then use them the way they want" (25). Going the logical next step, several purely electronic journals already exist in their own right (26).

A diffuse, distributed, locally organized crop of information, pushed by the technology and supported by the metaphor, is sprouting up amidst the tended rows of traditional information products. It is producing an environment of challenges and opportunities.

Whither Government Information?

The metaphor and, more fundamentally, the underlying technological changes that have created the new wine of electronic information, have significant implications for the institutions, practices, and future plans of those associated with the creation, maintenance, and dissemination of government information. The proliferation of information afflicts government information managers and users. The challenges of sustaining information in a networked environment—maintaining its availability, currency, location, and integrity—must be addressed thoughtfully and forcefully. Yet, the centralized models are reaching the end of their effectiveness. Many firms once successful at manufacturing vacuum tubes remain viable today, but none is in the semiconductor business.

Under a new model, the role of each participant would change. The government's centralized publishers—notably the Government Printing Office and the National Technical Information Service—would adapt to the new opportunities technology provides creators. They would shift their focus from access and production to building customized relationships with information suppliers and users. Similarly, Depository Libraries would adopt a new role, adding value by providing knowledgeable intermediation as regional or subject matter centers of excellence. Federal agencies would take responsibility for sustaining their own information. And the central management agencies would promote the development of quality standards to support these changes (27).

The decentralized, distributed approach suggested here will work best on a cooperative basis—building symbiotic relationships to recognize and deal with the real challenges. (Other scenarios—e.g., competition among institutions vying to maintain their traditional "turf"—can get to the same place, but more slowly and painfully (28). Two elements are needed: partnership and leadership.

Partnership among the stakeholders—government publishers and creators from all branches and levels, industry, the universities, the libraries, and users generally—means sharing responsibility, costs and risks. To work, it must be true sharing, not merely cost-shifting. A not-so-trivial example is the shift to local printing for online documents. A better understanding of the costs of doing business in this new way is needed, for electronic storage can also reduce the cost of shelf space. A basis for beginning the partnership may be discussions that acknowledge the importance of complementary information—focusing on each party's comparative strength in making information more available and more affordable to a wider public.

Operationally, of course, resources are scarce. Agencies are under direction to focus government resources where there is comparative advantage, that is, to core mission activities. In today's budgetary environment, anything that appears to be "overhead" is suspect. Many of the costs of information maintenance appear to be overhead at first glance, because of their indirect relationship to the core mission. In any ecosystem, as species die out the food chain remains viable for a while. Eventually, however, the whole system becomes vulnerable to stress, and the richness and sustainability of the landscape suffer.

While operational costs are an issue, capital costs will prove to be less so for the majority of participants. Experience with information systems shows clearly that the effective capital costs are overestimated when compared with the ongoing costs of operations. The fundamental infrastructure build-out will happen—fiber will go to schools and libraries, computers will find their way into the classroom--through complementary public-private efforts. The real obstacle will be training users and intermediaries. In this area, one model is TechCorp, a national, non-profit organization of technology volunteers, funded by the business community, helping to improve K-12 education at the grass roots through the effective integration of technology into the learning environment. Volunteers provide planning, technical support and advice, staff training, and mentoring, inside and outside the classroom (29).

Leadership is needed in two areas—modeling cooperation and policy. Discussions about the future of the depository library program, which were initiated by action of the Senate Appropriations Committee, can be a first step in establishing a more cooperative relationship among the various stakeholders in federal information. A more formal consultative arrangement that improves operational coordination among the parties may be ultimately needed.

On the policy side, history teaches that change will occur faster than anyone expects. The frustration with policy is that it usually addresses today's problem. Fortunately, the Paperwork Reduction Act of 1995 (P.L. 104-13, 44 U.S.C. Chapter 35) provides a strong framework for policy development. That Act recognizes the synergy that comes from a diversity of public and private information sources, and the importance of making underlying data available on an unrestricted basis in addition to providing information "by the drink." Undergirding the framework is the Act's pricing policy—that user fees for government information may not exceed the cost of dissemination.

Similarly, the Federal Records Act (44 U.S.C. Chapters 21, 29, and 33) is fundamentally sound. It creates a framework that permits agencies to manage and sustain information of record. It recognizes that not all information is created equal in terms of its preservation value. It generally empowers the agencies most familiar with the information to invoke their understanding of the need to preserve their unique holdings, such as a scientific paper or data set of dubious apparent value today but potentially priceless in the future.

Yet in both areas, implementing policy is needed to handle emerging issues. Only recently did the federal government issue final rules governing the disposition of electronic mail (30). Dissemination policy must continue to play catch-up with the technology (31).

The rest of Title 44—printing and the depository libraries—need a comprehensive look. Its printing provisions date back to a time when economies of scale in production dictated a large centralized printing plant to serve all of the government. Title 44 reflects a time when government information existed solely in paper form, necessitating a centralized distribution system where printed publications would be assembled and shipped to libraries nationwide. Yet reform should avoid the tendency to piecemeal solutions, and commit instead to comprehensive review and restructuring.

Conclusion

Government information policy stands at a crossroads. The tendency in the history of information has been to focus on the wineskin. In protecting intellectual property, for example, "the value (has been) in the conveyance and not in the thought conveyed. In other words, the bottle was protected, not the wine." (Barlow, 85) While this approach has served historically, the electronic era is turning it into an evolutionary dead end. Public policy should avoid a lengthy detour down that road, and instead, creatively manage the evolution of the future information ecology.

Notes

1. A variety of taxonomies exist to categorize the elements of adding value to "raw" information. For a fulsome treatment, see, Henry H. Perritt, Jr., "Unbundling Value in Electronic Information Products: Intellectual Property Protection for Machine Readable Interfaces," *Rutgers Computer and Technology Law Journal* 20 (1994): 415.

2. *The Wall Street Journal*'s "Personal Paper" service is an example. See also note 21, below.

3. See, Linda Scovill, *Librarians and Publishers in the Scholarly Information Process: Transition in the Electronic Age* (Washington, DC: Council on Library Resources and New York: Association of American Publishers, 1995), http://arl.oni.org/clr.Frontmatter.html, 3:1. This paper notes the need for editorial staff of technical journals to learn "Tek," a computer language used in the creating of articles in the mathematics and physics.

4. Ibid. Scovill provides a full exploration of the potential for a continuing role for publishers in these areas.

5. James Barksdale, President of Netscape Communications Corporation, quoted in Steven Levy, "How the Propeller Heads Stole the Electronic Future," *The New York Times Magazine*, 24 September 1995, 58.

6. U.S. Office of Management and Budget Bulletin 95-01, "Establishment of Government Information Locator Service," December 7, 1994, directed federal agencies to create an electronic "card catalog" of their paper and electronic information holdings. In a commercial example of using locator technology, bookseller Joel C. Turner closed his three book shops in the Cleveland area last year to open a books-on-demand service using reference CD-ROMs and online networks to locate hard-to-find books. He orders directly from the publisher via computer and even receives referrals from superstores such as Borders or Barnes & Noble. ("Undercover Book Service—Close Your Stores, Double Your Customers," *Business Week*, 20 November 1995).

7. "Preservation of electronic information may require the continued availability of computer software, operating systems, manuals, and hardware, as well as various types of electronic storage media." (US House Committee on Government Operations, *Taking a Byte Out of History: the Archival Preservation of Federal Computer Records*, 101st Cong., 2d sess., 1990, H. Rept. 101-978).

8. Digital signatures validate both the identity of the author and the integrity of a message's contents. Their widespread use requires a electronic registry of certified signatures, known as a public key infrastructure. For a discussion of electronic signature issues, see Peter N. Weiss, "Security Requirements and Evidentiary Issues in the Interchange of Electronic Documents: Steps Toward Developing a Security Policy," *John Marshall Journal of Computer and Information Law*, 12, no. 3 (October 1993).

9. Information futurist Paul Saffo believes the highway metaphor can "keep us from frying our brain synapses," likening it to "an ablative shield on a Mercury spacecraft...intended to burn away as the capsule entered the atmosphere." Paul Saffo, "The Information Superhighway is a 'Quivering Oxymoron' and Other Musings on Government Information Policy in an Era of Rapidly Evolving Information Technologies," interviewed by Steven D. Zink, *Journal of Government Information* 22 (1995) 4: 289, 291.

10. This technology permits multiple users to engage in a typed, online discussion where all participants see all responses in real time.

11. From May 1-14, 1995, the U.S. Office of Management and Budget co-sponsored a public, electronic, open meeting on the topic, "People and Their Governments in the Electronic Age." The meeting used the web, newsgroups, and email listservs provided by commercial online providers, public access sites, and toll-free modem dial-up connections. For a critique of the meeting, see Jennifer N. Henderson and Patrice McDermott, "People and Their Governments in the Electronic Age: Putting Government Information Online", (Washington, DC: *OMB Watch*, 1995).

12. Edward O. Wilson, *The Diversity of Life*, (New York: W. W. Norton, 1992), 158.

13. John Perry Barlow, "The Economy of Ideas: A framework for rethinking patents and copyrights in the digital age," *Wired*, 2.03 (March 1994): 89.

14. "In an industrial ecosystem...the consumption of energy and materials is optimized, waste generation is minimized, and the effluents of one process...serve as the raw material for another process," Robert A. Frosch and Nicholas E. Gallopoulos, "Strategies for Manufacturing," *Scientific American*, September 1989, quoted in Kevin Kelly, *Out of Control: the New Biology of Machines, Social Systems, and the Economic World*, (Reading, MA: Addison-Wesley, 1994) 178. Kelly also provides a good introduction to "artificial life"—self-replicating, evolving information systems—at 343-51.

15. Fritjof Capra, "Deep Ecology: A New Paradigm," in *Deep Ecology for the 21st Century*, ed. George Sessions, (Boston: Shambhala Publications, 1995), 20, 23.

16. For example, biologists differ as to whether the concept of species is the most appropriate unit for describing the elements of the biosphere. (Wilson, 38) Information scientists have no vocabulary for a like debate.

17. "Biological diversity is the key to the maintenance of the world as we know it. Life in a local site struck down by a passing storm springs back quickly..." (Wilson, 12)

18. Nathan Rosenberg, "Uncertainty and Technological Change" (paper prepared for the Conference on Growth and Development, Center for Economic Policy Research, Stanford University, June 1994), 13-14.

19. The problem of the commons arises when an unmanaged, limited resource can be used by any single user without damage, but the combined uses deplete it. The "commons" historically was the communal sheep grazing pasture in English towns. For one discussion of the problem in a political context, see Jonathan Rauch, *Demosclerosis: the Silent Killer of American Government*, (New York: Random House, 1994), 238-41.

20. "Frontline", PBS, October 31, 1995.

21. "Preserving Digital Information: Report of the Task Force on Archiving of Digital Information", Version 1.0, August 1995, Commission on Preservation and Access and the Research Libraries Group, http://www-rlg.stanford.edu/ArchTF/, esp. 6, 33, and 34. Apropos of the metaphor, one section is entitled "Information Objects in the Digital Landscape." Notably, this distributed organizational structure is becoming the paradigm for successful new manufacturing companies. These network firms are "distributed, decentralized, collaborative, and adaptive," focusing on their core competencies and partnering with others who actually build, ship, or maintain the products. (Kelly, 188ff.)

22. Such successes do not go unnoticed elsewhere. See, for a brief summary, "Future Shock: Surfing the Net in 'Nam: Like Other Authoritarian Regimes, Hanoi Fears 'Virtual Democracy' of Cyberspace," *The Washington Post*, 19 November 1995, A24.

23. Esther Dyson, "Intellectual Value," *Wired*, 3.07 (July 1995): 136, 183.

24. Joan O'C. Hamilton and Heidi Dawley, "Welcome to the World Wide Lab," *Business Week*, 30 October 1995, 66. To visit, see, http://golgi.harvard.edu/genbank.html.

25. Raymond Snoddy, "Media Futures: A publisher who had a global electronic dream," *Financial Times*, 16 October 1995, 13.

26. An excellent example is Complexity International, (ISSN 1320-0682), a refereed journal for scientific papers in complex systems research. Submissions and peer reviews are all conducted electronically, and journal is published one the Web. To visit, see http://www.csu.edu.au/ci/ci.html.

27. Public administration recognizes the shifts that are coming. Because of "Reductions in information costs brought about by computers and computer networks...The efficacy of the market and other self-organizing systems has increased relative to hierarchically coordinated systems...[and] The efficacy of decentralized allocation of resources and after-the-fact control has increased relative to centralized allocation and before-the-fact control." G. B. Reschenthaler and Fred Thompson, "The Information Revolution and the New Public Management," *Journal of Public Administration Research and Theory*, (1995) (forthcoming).

28. See Scovill, *Librarians and Publishers*, 3:14, for a view of various scenarios—ranging from "breakthrough" (collaboration) to competition to stagnation. The first assumes a nonzero-sum game—a "win-win" strategy. (Kelly, 89).

29. For more, see http://www.ustc.org or call (508) 620-7749.

30. National Archives and Records Administration, "Electronic Mail Systems," 36 CFR 1220 et. al., *Federal Register* 60, no. 166 (August 28, 1995): 44643.

31. U.S. Office of Management and Budget, Circular A-130, "Management of Federal Information Resources," *Federal Register* 59, no. 141 (July 25, 1994): 37906; and, U.S. Office of Management and Budget Memorandum M-95-22, "Implementing the Information Dissemination Provisions of the Paperwork Reduction Act of 1995," 29 September 1995.□

Notes:

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