





**CULTURE, SOCIETY  
AND ADVANCED  
INFORMATION TECHNOLOGY**

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## P r e f a c e

**M**uch of the world clearly is in the midst of a technological change that is transforming the way people collect, distribute, store and use information. Most of the public discourse and political debate has focused on technical or mechanical issues, as most people have been transfixed by the development and workings of the Internet, e-mail, the World Wide Web and the Java programming language.

But the emerging communications technology, like any technology, will be used by people and by institutions in social contexts. A critically important set of questions concern how societies, groups of people and individuals will interact with and be affected by this technology. Research on such questions can help identify technology-driven problems and opportunities and new uses for technology. It also will help inform the policy discourse to better ensure that the technological advances promote and improve the general welfare.

In June 1995 the American Anthropological Association and the Computing Research Association, supported by the National Science Foundation (NSF), hosted a workshop to explore research strategies and research topics on the immediate and potential social impacts of emerging communications technology. The workshop brought together social and computer scientists, fostering a rich and, perhaps, unique multidisciplinary discussion of the research needs generated by the new communications technology. This report summarizes the results of that workshop.

We would like to express our thanks to NSF staff for their helpful yet unobtrusive assistance in planning and running the workshop. Although NSF provided invaluable financial and staff support, the recommendations and suggestions here are those of the workshop participants and authors of this report. This reports does not reflect NSF policy or views.

We would particularly like to thank Allen Batteau of Wayne State University, who conceived of the workshop more than a year ago, worked tirelessly to make it happen and is principal author of this report. We hope this report will raise the attention of researchers and policy makers to the importance of research on the social aspects of emerging communications technology, and will lead to the development of thoughtful and far-reaching research agendas.

This report was prepared with the generous assistance of numerous workshop participants, including Jeanette Blomberg, Bryan Pfaffenberger, Rob Kling, Kerric Harvey, David Hakken, Karen Michaelson, Michael Muller, Bruce Tonn and Jon Anderson. Ron Kohler at Wayne State University provided valuable assistance in preparing the text.

Fred W. Weingarten, Computing Research Association  
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## Executive Summary

The National Information Infrastructure (NII) is the major technological development affecting broad segments of the American public at the end of the 20th century. Built upon convergent technological developments in telecommunications and computing and avidly promoted by industrial, government and academic interests, the NII is already changing the way Americans live, work, learn and consume.

Recognizing the potential of these technological developments to transform society, on June 1-2, 1995, the American Anthropological Association and the Computing Research Association, under National Science Foundation sponsorship, convened the *Workshop on Culture, Society and Advanced Information Technology*. This workshop brought 33 social and computer scientists from government, industry and the academic community together (plus three attendees from NSF, two from AAA and one from CRA) to examine the dimensions of social impacts of the NII and to ask what useful, critical and researchable questions the NII raises for society.

It is important to understand how social groups use, adapt and reinterpret technologies such as computing and digital telecommunications, often in ways not anticipated by those who design the systems or those who create policies for their deployment and use. New ways of creating, storing and transmitting information are transforming institutions and cultural practices. A dialogue among information scientists, marketers and policy makers, on the one hand, and social scientists, on the other, will enhance the possibility that these new technologies will contribute to a better world.

The workshop found that recent breakthroughs in the speed, communications capability and storage capacity of digital information devices would have far-reaching and unforeseen effects on families, communities, institutions and democratic processes. To understand the social consequences of these breakthrough technologies, government, academic and corporate researchers need to build on the solid foundation that exists in studies of sociotechnical systems, media studies and online communication; in the social science study of computing; and in the social sciences generally.

To further this understanding, the workshop explored the implications of these new technologies for the education and careers of social scientists, as well as social science methods, funding, ethics and theory.

## **A** Background

The National Information Infrastructure (NII) is a major technological development affecting broad segments of the American public. Built upon convergent technological developments in telecommunications and computing and avidly promoted by industrial, government and academic interests, the NII is already changing the way Americans live, work, learn and consume.

In the late 1980s significant publics outside the academic community became aware of the Internet, seen by many today as an NII prototype. In 1988 Prodigy, a major consumer-oriented online service provider, was created by IBM Corp. and Sears Roebuck and Co. In 1992 then-Sen. Al Gore announced his vision of an “information superhighway” that would link America in much the same way the asphalt interstate highway system linked America in the 1960s and 1970s. In 1993 the Federal Information Infrastructure Task Force was created, coordinating activities in 12 federal departments and agencies. Also in 1993, every major news magazine had a cover story on the information revolution, and corporate America spent nearly \$100 billion on media deals, information technology plays and entertainment acquisitions. Other events, including a reform of the Telecommunications Act of 1934 and a new regulatory regime at the Federal Communications Commission (FCC), likewise signalled that the nation was in the midst of a fundamental social change.

Recognizing this, in 1994 the Office of Cross-Disciplinary Activities within NSF’s Computing and Information Sciences and Engineering Directorate commissioned a workshop to develop a research agenda for examining the social implications of the NII. The lead organizers for this workshop—the American Anthropological Association (AAA) and the Computing Research Association (CRA)—brought together an interdisciplinary group of social and computer scientists from the academic community and from computing and telecommunications companies to identify research questions and issues in areas such as freedom of speech, civic participation, workplace transformation, educational equity, gender roles and threats to privacy on the information superhighway.

The public hunger for information on the social aspects of the information superhighway was well illustrated by a series of events nearly contemporaneous with the workshop. A term paper by an engineer-



ing undergraduate student purporting to show that most of the traffic on the Internet was pornographic was seized upon and misinterpreted (in a cover story) by a national news magazine as part of a story on a Senate bill to regulate the Internet.

In the *Workshop on Culture, Society and Advanced Information Technology*, 39 participants spent two days discussing the social science of design, development and deployment of information systems; the consequences of these technologies for families, communities and work groups; and the relationship between telecommunications technologies and public discourse. In advance of the workshop, short interest statements written by each participant were circulated. These statements were published in a special issue of *Social Science Computer Review*.

This report presents the conclusions of the workshop. This report describes the different research issues identified in workshop discussions and some of the crosscutting themes and research questions on which a consensus emerged.

In proposing the workshop, AAA and CRA observed that:

“...The numerous popular discussions of virtual communities are scarcely informed by the past 70 years of sociological insight into the functioning of communities in the more traditional sense; ‘Cyberia’ has yet to find its Margaret Mead.”

The NSF workshop began to define a solid conceptual foundation for addressing a set of research questions that will help Americans understand and shape life in the “New Information Society.”

## **B** Conceptual Foundation

Information technology is advancing more rapidly than our ability to understand the social forces producing it and the far-reaching implications it has for society. Technological breakthroughs have dramatically increased the speed, communications capability and storage capacity of digital information devices. These breakthroughs include the proliferation of packet-switched networks, which provide greater capacity and robustness in long-distance transmission of digital messages, and their integration into the Internet; advances in processor power; and new techniques for data compression. Decreasing unit costs for these technologies are resulting in increased ubiquity of computing and digital communications capability.

The fundamental observation of the workshop is that the NII, like all other technologies, is a social product, and social decisions and interests are reflected at all stages of its design, deployment and end-user appropriation. Workshop participants agreed that social and technical issues are always intertwined. New information technologies must be understood both in relation to other technologies as well as in relation to the social context of their creation and use. The boundaries of the New Information Society are not yet clear, but do go well beyond the much-hyped information superhighway. They embrace other technologies of storing and delivering digital information, such as CD-ROM and satellite transport, with as-yet-unanticipated consequences. Because of this, the workshop broadly examined culture, society and advanced information technology.

There was a strong consensus within the workshop on the reciprocal influences of technology and society. These reciprocal influences were variously characterized as “co-evolution,” “mutual adaptation” or “mutual determination.”

Hence, the workshop looked well beyond the formula of societal impacts of the NII to consider additionally the co-evolution of information infrastructures with a variety of social formations including the individual, primary groups, social classes, status, occupational groups and the different constructions of national identity.

This concept of co-evolution contrasts with a dominant assumption in American culture and certain academic circles about the technological imperative. In this latter view, technological change is seen

“It is useful to think of [the NII] not as a tool or a place, but rather as a social presence that must be factored into the organizational dynamic of any given group as if it were a new and conspicuous member.”

—Kerric Harvey

“...These sorts of transport technologies are based...on visions of end users as active participants in egalitarian exchange or as relatively passive consumers of media products.”

—Michael Muller

as the driver of social evolution. Technology is seen as an autonomous and irresistible force to which society must adapt. In this view social choice is exercised only in the adaptation to technology and the control of dangerous technologies such as nuclear weapons. The continual wish in American culture for a technological silver bullet that will solve vexing social problems is a popular consequence of assumptions about the technological imperative (*Technological Utopianism in American Culture*, cf. Segal 1985).

The development and emergence of information infrastructures should be objects of social research. Current debates proposed by public and private groups over network architecture and different transport mechanisms reflect and embody the often unarticulated social assumptions of those groups. A useful example of this is found in the 1994 video dial-tone controversy. This debate pitted regional Bell operating companies against cable companies, and featured charges of “electronic redlining” and debates over universal access. In the RBOCs’ petitions to the Federal Communications Commission and in the supporting engineering documentation, one finds reflected the social assumptions of the corporate, governmental and nonprofit groups involved in the controversy. Alternative network architectures reflected alternative social visions.

There is a solid and respectable body of social science study of computing, telecommunications and media studies on which the workshop built. Social science study of computing began in the 1980s with major works by Turkle (1984), Beniger (1986) and Zuboff (1988). Popular works have ranged from the utopian (Deken 1981) to the born-again cynical (Stoll 1995). Numerous organizations and monograph series have since added to this body of literature (e.g., Computing, Organizations, Policy and Society; NSF’s Ethics and Values in Science and Technology; and the Association for Computing Machinery’s Special Interest Group on Computer and Human Interaction). This research has tracked the transformation of computing as it emerged from the academic and corporate worlds into consumer and commodity-provider worlds where computers are viewed as arenas for social experience (Stone 1995). A similar transformation in digital communications, with the rise of arenas such as online chat rooms, is happening today.

The current body of research on the social aspects of computing and digital communications offers both a caution and a counterpoint to utopian visions of the information superhighway. The caution is that new technologies usually have unanticipated consequences; the counterpoint is that these technologies are shaped by social interests and forces.

The *Workshop on Culture, Society and Advanced Information Technology* concluded that the social issues in the design, deployment and use of a national information infrastructure should be informed by the interests, history and aspirations of citizens for their families, their communities and their world.



## **C** Workshop Findings

Advanced information technology, like the NII, is not a monolithic entity. Instead, it is a loosely articulated assemblage of publicly and privately sponsored networks, protocols, applications, interfaces, and digital and analog transport mechanisms. Likewise, society is not monolithic, but rather represents a mosaic, a conversation, and sometimes a shouting match among numerous and frequently contentious groups, institutions and interests. Understanding the relation among these groups, institutions and interests and the integration of networks, protocols, applications and interfaces that make up the information infrastructures is essential to understanding the impact of advanced information technology.

An issue we encountered before and during the workshop was the naming of the phenomena we were studying. As was the case with Columbus's encounter with the New World and its indigenous inhabitants, the existing stock of terms seemed inaccurate or inadequate: "Cyberspace" seemed too breezy, "information revolution" contained too much hype, and "telecommunications technology" was too narrow. The problem is further compounded by the near-totemic status of the computer in contemporary society: Events, happenings and (especially) mistakes are ascribed to "*the computer*." In many organizations, social status is signalled and maintained by one's relationship to the computer (or, with equal totemic emphasis, "the system"). For convenience, however, throughout this report we will refer to the collection of technologies we are particularly concerned with as the NII—although we recognize the technology's global scope—or simply the information infrastructure. The appropriate characterization of emerging social formations, both local and global, was a central theme of the workshop.

### **C.1 Privacy , Identity and Social Roles in the New Information Society**

A question that recurred in many workshop discussions was the nature of individual identity and sense of self in the online world. Our identities are constructed through interaction with others. As these interactions increasingly are mediated electronically, new ways of constituting the self may emerge.

Research into the effects of electronic information technologies on individual identity formation is needed. The possibilities afforded by new technologies for developing novel relationships among designers and users, including constructions of personal and professional identities, also should be examined.

The question of individual identity formation in the age of the computer and telecommunications has been addressed for many years. Sherry Turkle, in *The Second Self*, examined the psychological aspects of an earlier generation of computing. More recently, studies of interactive media have examined the possibilities for the reconstitution of the self in virtual environments.

An important part of the sense of self is the sphere of privacy that individuals maintain. This issue was addressed as early as 1977 by the Federal Privacy Protection Study Commission (*Personal Privacy in an Information Society*) and by more recent works by Marx (1984) and Branscomb (1994). The sphere of privacy will inevitably be altered as digital communication becomes increasingly ubiquitous. Advanced information technology amplifies and alters existing surveillance patterns in homes and workplaces. Individual and community responses to this increased surveillance have varied as have the norms of personal boundaries in the home, the workplace and the public square.

The study of online communication is a growing field, beginning with the work by Sproull and Kiesler (1991). People make decisions to interact with face-to-face communication or electronic media in a variety of ways. An *ecology of media* should describe how people use the increasingly different media that are becoming available.

One area where individual roles do stand out, begging for greater insight, is the various roles in the design context of the NII. Systems designers are creating more open, inclusive design strategies such as participatory design. The use of ethnographic research in understanding user requirements is a growing field.

As we understand the social roles, cultures and subcultures that appear in development organizations and their organizational life cycle, we can better define the role of social scientists in systems

“What is new about computers is their scale: the time (short) and distance (long) that they warp in comparison to previous human experience.”

—Bonnie Nardi

“Use of the Inter net makes one aware that private communications easily become public communications in a matter of seconds.”

—Peggy Overbey

“What are the social correlates of less face-to-face communication? How does online participation affect offline events?”

—David Hakken

“The technical design of the electronic information systems tends to drive the information structure and content rather than being driven by the social and cultural needs of end users.”

—Inga Treitler

development. We need to understand who the stakeholders in systems development are and how their temporal positions in the process affect their role, power and prestige. How social scientists navigate through the complex cultural and ethical issues involved in research among people who have direct and indirect stakes in the outcomes of the social research was an issue for several workshop participants. Several were interested in learning how social science research issues and methodologies have contributed to the development of new technologies within systems development organizations. Stakeholder roles include marketing, software engineering, hardware engineering, technical writing, training, hot-line support, installation and maintenance. The end user, too, is a stakeholder. Both commonalities and differences exist in the stakes of these other constituencies, particularly when compared with the stakes of the traditional subjects of social study, such as professional development staff and managers.

It is important to know where and with what result social research and ethnography in the design process have made a positive and beneficial difference in systems design. There are large social or cultural distances between user communities and design managers that may impede the usefulness of participatory design. The difference between democratic participation and manipulative involvement exercises is not always clear. In the resolution of these issues, social science may become yet one more stakeholder in the design process.

Finally, a new role that social scientists have only begun to examine is the intensely social nature of learning about computers. In contrast to the solitary hacker of fiction, whose only life is online, several observations have indicated that most people learn about computing and how to use computing resources in a social setting, with help from friends and co-workers.

Understanding how the use of computers grows in homes, schools and workplaces and how these reinforce each other will have important implications for understanding changes in these institutions and the stratification of the changes by class.

Some examples of research issues regarding individual identity and social roles include:

“For some people, understanding and processing the virtual environment and its capabilities come not from solitary exploration, but from viewing how other people use the environment and from explanations and intensive hands-on guidance from human assistants.”

—Patricia Sachs

- Is there a greater fragmentation of the self in the online society?  
Are there new possibilities for synthesis of new identities?
- Are the quantitative improvements in information processing and storage capability creating qualitative changes in the nature and boundaries of privacy?
- What are the appropriate inputs from social science research in systems design and development? What are the standards for effective use of social science knowledge in systems development?
- How does learning take place in an online or computer-mediated environment?
- As online relationships extend beyond corporate and geographic boundaries, does the character of these relationships change?  
What are the possibilities of online interaction not reinforced by employment, political or other affinities?

As users and systems designers understand the answers to these and other related questions they will have a better ability to develop and adopt applications that are life-enhancing.

## **C.2. Family , Work Groups and Personal Relationships**

People build their lives in small groups: initially, the family and later, friendships, work groups and educational and religious organizations. These usually differ from larger, secondary groups in that relationships are face-to-face, multistranded and often long-standing. Built into them are personal histories, stories and narratives that lend the relationships many levels of meaning. Although these are frequently constructed around locality, such close relationships are not necessarily constrained by distances.

There is a rich tradition of studying the effects of computers and telecommunications on small groups. Shoshana Zuboff's *In the Age of the Smart Machine* (1988) examined how computer-mediated information and the knowledge based on it have displaced other forms of



knowledge in work settings, thus changing the character of social relationships in those settings. Sproull and Kiesler (1991) studied the new affiliations and formations that result in work settings from the extensive use of e-mail for communications. Bryan Pfaffenberger, in "The Social Meaning of the Personal Computer" (1988), demonstrated a continuity between social developments resulting from computer usage and other trends in an advanced industrial society.

A broad and related body of research is found in media studies, particularly the effects of mass media on families and small groups. Inasmuch as some visions of the NII adopt a broadcast model (500-channel cable TV) with rich images sent (downstream) into homes, libraries and workplaces and limited signaling capability back (upstream) to the origination of the broadcast, these studies provide comparisons for understanding this one aspect of the NII. Studies of the effects of mass media range from scholarly studies to polemical tracts, including McLuhan (1964), de Sola Pool (1983) and Postman (1985). A lengthy series of media studies (e.g., Gurevitch 1982; Sklar 1980; Barnouw 1978; Mander 1978) have examined the social production and consequences of television and other new media (cf. Conference on Behavioral Science and the Mass Media 1968). All of these works draw from a common question of what happens to social life as human interactions become increasingly borne by electronic media.

The nature of small groups is to embody face-to-face, textually rich (broadband) communication. Facial expressions, bodily gestures, tone of voice, accent and speech rhythm—often culturally stylized—provide a richness of communication that, outside of laboratory environments, is still not fully reproducible electronically. Electronic media, ranging from TV cartoons to video games to the World Wide Web, replace this personal, multilayered richness with impersonal, textually impoverished yet visually stimulating images. To the extent this uses the resources of small groups (time, space or children's attention spans), it is an imposition on those groups. In some cases families and small groups can appropriate and manipulate the media; in other situations, families and small groups lose their importance in the mediated environment.

One can expect the character of these primary relationships to change with the availability of new information technologies. Within larger

social contexts, differences in status, power, skills and gender are associated with how people create, adopt and use new technologies. These processes may similarly be reproduced within smaller, more intimate groups. The intangible nature of online communication can be expected to affect people's perceptions of themselves and their role in society.

Several important research questions are suggested by these concerns:

- As people from diverse groups incorporate new information technologies into their everyday lives at work, home and school, and their worship and play, how do the social relationships of these activities change?
- How can online resources be designed so they enrich rather than compete with personal and familial relationships?
- Does the availability of the information infrastructure lead to a broader or a more constricted network of social relationships? Is this result related to network architecture?

### **C.3. Public Institutions and Private Corporations**

Major investments have been made by government and industry in the development of information technology applications for schools, libraries, hospitals, local governments, municipal services and corporate operations. Telemedicine, electronic commerce, distance learning and digital libraries are much-discussed applications, with numerous public and private agencies supporting their development. Some of the effects of this technology already are evident in the corporate world: The decentralization of operations in financial institutions, manufacturing and retail services has created much greater flexibility for corporations. However, this is introducing greater instability in lower-level jobs as corporations move back office or supplier operations to lower-wage regions. Conversely, previously isolated regions now have access to formerly unavailable information and jobs.

Studies of the institutional effects of information technology have focused on three areas: the impact on operations, the transformation of operations and the transformation of organizations. The impact of

information technology on operations is represented by a sizable body of literature on office and manufacturing automation including Adler (1986), Zuboff (1988) and Strassman (1985). The ironic conclusion of much of this research is that corporate investments in information technology have not yielded the expected returns in productivity. Recognizing this, a second strand of inquiry has examined how information technology can enable the transformation of work processes (Davenport 1993; Hammer and Champy 1992; Majchrzak 1988). Work routines formerly organized around paper records or mainframe transactions can be decentralized and streamlined as workers acquire the latest in information processing power on their desktops. The most recent strand in this research, using terms like “virtual enterprise” and “virtual manufacturing,” anticipates a complete transformation in the structure of organizations as propinquity and face-to-face communication become less important in the management of organizations (Davidow 1992).

With regard to both public and private institutions, we want to identify and understand the effects of new technologies, especially the global information infrastructure, on how the members of or participants within these institutions are chosen and how it affects their behavior in the office. This question is pertinent at all levels of an organization, management as well as the rank and file. We want to understand the technology’s effects on their institution’s processes and the impact on the concomitant public policies. The advent of television had profound implications on political parties and the rise of celebrity candidates. The NII will similarly transform authority, although in ways not yet understood.

The uses and effects of the new technologies will be different at various levels of government (national, state and local); they will vary among institutions (executive, legislative, judiciary and advocacy organizations) and between similar institutions at similar levels. Some levels, branches or jurisdictions may offer e-mail access to their citizens or constituents, even as others do not. This variable deployment and use of the information infrastructure will transform existing public and private institutions and create new ones.

In service institutions, the use of this new technology will alter the nature of the service. A digital library is not the functional equiva-

lent of a walk-in public library. In many ways it can provide an improved service, but in other ways the walk-in library may be superior. More broadly, advanced information technologies will influence and alter existing channels of mass communication, enhancing some media and displacing or replacing others.

Within public and private institutions, a variety of objectives are being pursued by the adoption of advanced information technology. Some of these objectives, not always compatible with each other, include improved quality of work life, centralization of control, increased agility and productivity, and improved products and services. Nearly always, there are trade-offs among these competing objectives, trade-offs that frequently are configured into the design of the systems. For example, interactive voice response systems (IVR)—sometimes mistakenly referred to as voice mail—interminably bounce callers from one unsatisfactory node to another. IVR comes down on the side of cost reduction, at the expense of customer relations. To what extent do the corporate users of IVR systems realize they have made this choice? Or was the choice made for them by the designers? This example can be generalized; inasmuch as most public and private leaders do not understand this technology, strategic choices are being made for corporations and government agencies by systems designers and vendors. These questions have been raised previously with regard to office automation (Strassman 1985) and factory automation (Zuboff 1988). In contrast, information technology in the networked world offers far greater social leverage than earlier stand-alone islands of automation.

One concern of several workshop participants is the redesign of work that the information infrastructure enables.

Use of new information technology can both lead to greater visibility of work and further separate the design of jobs from their execution. The former leads to greater respect for that which was previously disvalued; the latter further alienates the worker. Here the absence of social science research incorporated into design is most telling. The questions this poses for systems designers, business analysts and sociologists of work life have important consequences for how effectively and productively this new technology is used. Such questions include:

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“To understand work requires close engagement with its practical details; work disappears at a distance.”

—Jeanette Blomberg

“At a time when community life in North American cities is unraveling, some analysts hope people can meet and enrich their social lives at work and at home via computer networks.”

—Rob Kling

- How does an organization achieve a proper balance among the alternative goals for the use of this technology? Are there early warning mechanisms to assist with this before major design and deployment investments are made?
- What are the mechanisms or structures that would help the NII to enhance rather than degrade the quality of work?
- In what ways are the goals for using advanced information technology unique in different institutional contexts, public and private? What consequence does this have for the design of systems for these institutions?

Technology policy in corporations and governments is only beginning to grapple with these critical issues. Better research on organizational alternatives in the online environment will better enable public and private leaders to direct and deploy technologies that further organizational goals.

#### C.4. Communities: Virtual and Real

A long-standing concern of the social sciences has been with the source, nature and fate of the community, considered as a localized group intermediate between primary groups such as the family and societal formations such as national governments and regional entities. Some of the greatest excitement over the NII is packaged with the concept of the virtual community, understood as an arena of personal engagement and long-standing, caring relationships (Rheingold 1994) and the promise of forming meaningful relationships unconstrained by geographic distance or the markers of social status.

This concern over the effects of information technology on the community lies within a strong tradition of studies, ranging from the popular (Deeken 1981; Rheingold 1994) to the scholarly (Hudson 1984; Jones 1995). Even some of the classical community studies in American sociology (Lynd and Lynd 1929) inquired into the effects of information technology—which in the Lynds’ case meant radio—on communities. Most of the contemporary studies, unlike the classics, either pose questions in the face of rapidly advancing technology or

present a utopian vision of the possibilities of that technology.

In contrast to these utopian visions, workshop participants found several issues bearing on the meaning of community and the competition of communities with mediated affiliations. Some communities have more access to the information infrastructure than others; this access shapes the technologies in ways not yet fully understood. When the development and deployment contexts are more congruent with each other than with the larger society, at some point this restricts access for those outside the development and deployment contexts.

The reach of the NII into local communities needs to be understood. Actions taken in distant locations are affecting local communities, a process enabled by improvements in telecommunications and computing. For example, documents created in the United States are electronically shipped overseas for further processing. Airline reservations placed in California are processed in Kansas. Telephone company operators in California can lose their jobs to workers in Texas simply because the company can reroute the calls. For some communities this technology empowers their members and deepens their social relationships and support; for others, it leaves them more vulnerable. The same technology that can foster a sense of community can also be used to restrict access, both to technology and to other resources. Linguistic, social, economic and cultural boundary mechanisms maintain and separate communities; these can be both reinforced and overcome by the NII.

As new technologies are adopted, they are transformed by specific groups and communities. We need to understand the dynamic interplay between technology and social life. The complex relationships between organizational culture and the structuring of technological or communications media deserve study. Technology is always reconstituted by local groups.

There are numerous possible roles for organizations based in non-elite constituencies in shaping the NII. Examples of these groups include community groups (including community networks), unions and other labor organizations, and students' and citizens' groups organized around particular concerns. The diverse histories of such groups in the growth of the NII deserves study.

“What will be the impact (positive or negative) of the NII...on social intercourse critical to building communities, to encouraging social civility and on social structures that support families, children, equitable economic growth and democratic principles?”

—Jack Cornman

“Electronic services compete with public places; few people log on to an online service while participating in a face-to-face group meeting outside their homes.”

—Rob Kling

Within different communities, there are different pacesetters in adopting advanced information technology. These pacesetters are often distinguished demographically, culturally, attitudinally and socially. There are nonadopters; understanding who they are and how the cost of nonadoption is borne remains to be understood. This varies by community, as different individuals and groups make the transition from merely having or qualifying for access, to participation, to finding a voice in online arenas. Advanced information technology interacts with existing legal, moral and ethical conceptions. As communities adjudicate the resulting conflicts, these adjudications reconstitute and reshape the information infrastructure.

Some of the research questions raised during the workshop include:

- What are the different roles within a community with respect to this new technology? Who are the innovators, the nonadopters, the resisters, the adapters and the alienated? How are these distinguished?
- What are the boundary mechanisms in the New Information Society that create community? Are online arenas building new communities as they undercut the old?
- Do online arenas displace ongoing communal activities or fill social voids? Is the technology reconstituted within the local context or imported without alteration?
- What distinguishes communities in terms of their different responses to the NII?

Community leaders, both formal and informal, need solid research findings if they are going to be able to address the ways in which the NII will change their communities.

### **C.5. Implications for Public Policy and Decision Making**

The NII has far-reaching policy implications, both in the narrow sense of telecommunications policy—who will own it, pay for it and have

“[Technological changes] allow not only virtual reality, but also new venues through which people can meet one another, jointly plan projects, give and receive help, organize themselves for action, and frighten and victimize each other.”

—Jim Katz

access to it, and how will it be regulated—and in the broad sense of how public discourse and decision making are conducted in America. Because the workshop was concerned with broader questions of culture and society, it reserved the narrower sense of telecommunications policy to other forums and focused instead on the broader issues.

Much of the previous research on the effects of information technology on public decision making has been that of media studies examining the effects of mass communication on politics and government. Notable work here includes the propaganda studies of Robert E. Park and Charles H. Cooley and more recent work by the Langs (1983), Lance Bennett (1975, 1980) and McCombs and Shaw (1977) (cf. Lippmann 1965). Fewer studies have examined the effects of networked communication on decision making, usually examining the use of computers in cooperative work settings (cf. Schrage 1990). One classic 1983 study, *Technologies of Freedom*, anticipated many of the current issues of broadcast versus networked communication, alternative transport and the growing opportunities for connectivity resulting from new technologies such as digital networks connecting households (de Sola Pool 1983).

There are four broad-reaching areas of inquiry that acquire great urgency in the New Information Society. These are the issues of information and self-government, the legitimization of democratic and authoritarian governments, participation in public discourse and universal access to the infrastructure of the New Information Society.

An information infrastructure has the potential both to promote the flow of information or constrain it by spreading information of suspicious quality. The information infrastructure can improve the quality and richness of communications and also reduce the ability of people and institutions to communicate effectively.

Communication affects the way authority is exercised, either by supporting the legitimate exercise of authority or by undermining authority.

Likewise, communication is central to the electoral process. The NII can improve our ability to debate issues and judge candidates, or it may reduce the quality of campaigns.

“To what extent does cybercommunication replicate pre-existing communication patterns of domination, hegemony or aggressiveness?”

—David Hakken

“[Advanced information technology] can inspire populism, but one based on ignorance; it can facilitate the expression of public opinion, but one inspired by demagoguery; it can engender community, but of ethnic, religious and single-issue groups.”

—David Paletz



“If the semiotics of computer-mediated communications software available to users is incompatible with their own linguistic ideologies of how and for what purpose language-based communication is to be used, then acceptance and use of NII software is much less likely.”

—Anita Puckett

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“Access and benefit from the Internet appear to be connected to social class, cultural education and skills in coping with new technology.”

—Ron Anderson

These questions are complex and are essential for the study of a democratic way of life. Research needs to begin now—when advanced information technologies are just beginning to spread in society—to allow the possibility of establishing control groups for study and, more importantly, to provide insights that allow proactive rather than reactive decisions regarding technology and public discourse.

Issues of legitimization and participation stand out as requiring particular attention. The critical issues include:

- How are conflicts over the proper bounds of public discourse played out in the multiple contexts of information technologies?
- How do information-seeking patterns fostered by advanced information technologies authorize new voices, persons and concerns and call existing ones into question?
- How do cultural constructions of legitimacy, knowledge and authority affect developing information technologies? How are they affected by the technology?

Public discourses shape our shared and individual cultures including our own notion of self-government. These discourses set public agendas, legitimize public decisions and governmental authority and create participation in governmental processes. People participate in many different public discourses as members of many different publics. It is important to learn how advanced information technologies affect the breadth and depth of the content of public discourse as well as the participation of publics in public discourse.

A public conversation in an online arena might be conducted differently, affecting which voices are heard and which are excluded.

Research areas related to these issues include:

- What new publics are created in online arenas? Are they organized according to demographic criteria such as age, race, gender or geography or by some other criteria? What affinity groups are created?
- What is the relationship between cognition and communications technology as it relates to public discourse? Do specific modes for

conducting public conversation invite or grant a privilege to certain linguistic or conceptual forms of dialogue?

- How is “access to public discourse” to be defined? What publics? How might access to technologies affect access to discourses?

A recurrent theme in several discussions and issue papers was the question of universal access. There was a strong consensus that “access” was far more than a matter of access to physical devices and cable networks.

Access relates to the availability of and familiarity with end-user devices as well as the underlying architecture one is accessing.

Access is not just a matter of the tools, but of the information resources as well.

Information resources such as Web sites are needed in many languages that speak to the community and cultural interests of ethnically, racially and economically distinctive populations.

Research questions regarding universal access to the NII include:

- What are the social and cultural barriers to and enablers for using online resources and capabilities?
- What are the differential benefits for different groups in the society of the NII? Are the content and capabilities of existing online resources of greater value to some groups than others?
- How do alternative network architectures and applications designs affect access?

Only by answering these and related questions can meaningful policy decisions be made promoting universal access.

“Will we see a horizontal switched network like the telephone system, in which any user can communicate with any other, or a vertical network in which messages only go one way, as with traditional television?”

—Gary T. Marx

“Advanced information services provide a narrow range of information and omit many of the interests of inner city residents.”

—Lorri Clark

“Internet information, by virtue of the technology associated with its creation and dissemination, acquires, much like talk radio, new forms of credibility independent of its factual veracity.”

—Allen Batteau

## C.6. Implications for Knowledge and Culture

Culture, in the sense of the shared traditions and representations of a society, has a profound effect on the design, adoption and use of computing systems. Likewise, the effects of electronic communication on American culture are well-documented, if not uniformly uplifting. The extent to which further capabilities and ubiquity in electronic communication will fragment American and other cultures or create a new, national conversation has been a matter of no small concern for many years. Weizenbaum (1972), Bolter (1984), Beniger (1986) and Kidder (1981) examined how computer technology—albeit in the earlier generation of computer-as-tool—is reshaping our culture.

Within the emerging paradigm of computer-as-social-arena, one can ask about the effects of ubiquitous digital communication on society’s information environment. The NII has the potential to alter the speed, scope, quantity, quality, meaning and credibility of the information communicated between individuals as well as between individuals and their institutions.

Contemporary understandings in anthropology see culture not as a monolithic whole, but as a mosaic of symbols whose meanings and constitution are continually negotiated among different groups and publics within society. Groups that have greater ability to manipulate symbols and information have a stronger hand in such negotiations.

Different publics make different use of the information they encounter, seek and navigate through. Use of one form of advanced information technology may indicate a predisposition or likelihood to use other versions of new media; this would suggest the possibility of an information elite. Alternatively, such use may be exclusive of using other technologies or media, thus suggesting a group’s boundary maintenance or attempts to counter or circumvent the intrusions of other groups.

When online information sources replace sources of knowledge based in other media and other contexts, cultural content will change. The possibilities of this can already be seen in the emergence of “infotainment” and “edutainment”—media forms whose possibilities are multiplied by digital information processing. Online

“What are the implications of NII and multimedia technology for educational practice, organization and culture?...

Can the technical capabilities of new-and-improved multimedia technologies deliver added educational value at lower cost, with at least tolerable drawbacks?”

—Bryan Pfaffenberger and

sources of knowledge that replace interpersonal sources, such as the older generation within a given society, devalue both the knowledge and those who bore it.

The cultural issue is most pressing in the educational arena. We should be asking how advanced information technology interacts with changing conceptions of knowledge and education. Certain types of knowledge are communicated best in print, other types in images. Society's repository of knowledge will be affected by the extent to which images crowd out print in public attention, including in the classroom.

We identified five examples of research questions regarding the effects of the NII on knowledge and culture in the New Information Society:

- How credible is the information, and how is knowledge verified? Are there many alternative “truths?” How do individuals determine what is rumor and what is fact in online arenas?
- When anyone can publish, what new forms of news are created? Does the speed at which news travels have an impact on public discourse?
- How will the information-processing limitations of people, organizations and institutions affect public discourse? What are the alternative navigation strategies that mitigate tendencies of individuals to select only those truths palatable to them and exclude all others?
- What are the effects of different levels of technology—individually, locally, nationally and globally—to accessing information and managing its flow? Will the capacity to manage information flow be different for various people, organizations and institutions?
- What are the impacts of freedom of speech issues and censorship on information available to individuals and on the capacity of individuals, organizations and so forth to participate in public discourse?

The culture of the New Information Society will be different from that of contemporary American society. This difference is neither an

“The information revolution that has reached little of the Middle East has already arrived for the Middle Eastern diaspora around the world. They have organized corners of cyberspace that range from ordinary news letters to daily digests to open-subscription lists. And these concerns reflect the organization of their communities.”

—Jon Anderson

inevitable consequence of the technology nor an uncontrollable evolution. This new culture, rather, will be the result of negotiations and decisions being made today on the design and deployment of information infrastructures. Understanding how these technological decisions can have cultural consequences is essential for the development of an information infrastructure that will support American ideals.

### C.7. The Global Information Infrastructure

Many workshop participants agreed that the nature of this technology made it more appropriate to talk about a global information infrastructure. The Internet reaches around the globe, although some nations are more wired than others—a status that correlates imperfectly with economic development level. Further, the Internet is creating a new global citizenry, a creole identity sustaining new forms of nationalism.

The body of scholarly knowledge on the global information infrastructure, particularly with regard to less-developed countries, is itself less developed than other areas described here. This is to be expected, given that the penetration of these technologies outside academic and industrial settings is a very recent phenomenon. Exemplary studies include Hudson (1984), Cronin (1991), Saunders (1994) and Kottak (1989).

Most of the issues identified thus far are not confined to the United States, but rather have ramifications for both developed and less-developed countries. The information infrastructure is, in a certain sense, a borderless technology, if one understands borders as a matter of lines on maps.

Given this fact, workshop participants spent less time focusing on uniquely global or international issues. However, two themes or assumptions did run through several discussions and deserve mention.

The first is the effect of this technology on elites that maintain their position by restricting the flow of information. Ayatollah Khomeini's use of audiotapes to foment revolution and the use of the Internet to get news out of Russia during the parliamentary revolt of 1993 are well-known stories. We can expect further stories to emerge, perhaps

suggesting a twilight of the authoritarian regimes. Alternatively, governments may manage to control the technology and thus have one more instrument of control.

A second background theme was the relationship of this technology to the globalization of business and the effects of this globalization on indigenous peoples. Again, the fragmentary evidence is contradictory, with some indigenous peoples abandoning a traditional livelihood for participation in the monetized economy, while others are getting on the Internet to communicate with remote villages. These contradictory anecdotes should cause us to question any unilinear assumptions regarding the impact of the NII on society.

Three research questions emerged as deserving attention, given that the global information infrastructure is in its early stages of growth:

- In what ways can a global information infrastructure help address the borderless problems of environmental degradation, overpopulation and refugee movements?
- What are the effects of new information technologies—whether cellular telephones, satellite direct-broadcast television or computer-mediated communication—on indigenous populations? What characteristics of a people enable them to adopt and adapt to the technology or leave them vulnerable to other groups' use of the technology?
- What is the long-term stability of political regimes in industrialized and nonindustrialized regions in the new communications environment? How are governments using the new technology to extend their legitimacy and control? How are others using the same technology to destabilize and delegitimize authoritarian and democratic regimes?

“The Internet, the World Wide Web, satellite communications and cellular technologies are contributing to the globalization of production and the creation of hybrid, locally constituted forms of cultural expression.”

—*Jeanette  
Blomberg*

## **D** Crosscutting Issues for the Social Sciences

“In the design of computer networking systems, social scientists should be positioned as interpreters of diverse participant voices and facilitators of communication across differences. For most anthropologists... this would entail substantial shifts in the audiences of publications, the framing of research findings and writing practices.”

—Mizuko Ito

Also discussed in the workshop was a set of issues that might be characterized as the infrastructure of social research. These include the training of social scientists, the methods and data resources available, the new ethical issues posed in the online world and the theoretical challenges created by new social spaces and new forms of communication.

### **D.1. Training and Careers of Social Scientists**

There is a need for facilitating dialogue between social scientists and information technologists. A review of the social science curriculum to identify the needs for social science in the New Information Society is in order. Computer scientists should take media literacy courses; there could be a seminar for social scientists taught by the people creating the next generation of technology.

Ethnographic methods are used—and sometimes misused—by untrained practitioners in industry. As a corrective, social scientists should be trained in technical areas so they can take jobs in industry and thus participate in systems design.

### **D.2. Methodology and Scientific Resources**

There was a strong consensus that existing data resources are inadequate for understanding what is happening in society as a consequence of the new technology. Data pools that inform us of how, where and by whom the systems are being used are required before any conclusions can be drawn regarding the technologies' impact on society.

Existing surveys such as those conducted by the Census Bureau or the National Opinion Research Center need to be evaluated for their adequacy for examining the data and critical indicators of the New Information Society. Many workshop participants concluded that baseline surveys of communication traffic and sites were needed to better understand the information infrastructure's social presence. Types of data that such surveys would yield might include textual

studies of messages, behavioral data, and longitudinal and cross-sectional data.

Methods in linguistic or communication analysis that are sensitive to revealing social or cultural relationships and changes in these relations are important. These include, but are not limited to, methods appropriate to ethnographies of communication; ethnographies of discourse; pragmatics, including speech act theories; sociolinguistics; sociologies of language; creolization or pidginization processes; code switching; and ethnosemantics. Particularly desired are novel and innovative applications of such methodologies to NII settings and communication data, especially those accounting for the complex interrelationships among face-to-face and distance or electronic contexts.

### D.3. Ethics

Several participants expressed concerns over the unique ethical questions posed in cyberspace. Online research is a growing topic. In the online world, both researchers and research subjects are potentially anonymous. This places one or both in jeopardy of being ethically compromised. Traditional protocols of informed consent may be inappropriate in a social space where research subjects insist on anonymity. Every effort must be taken to ensure that the collection of data is sensitive to the privacy and security of subjects. Additionally, when one introduces indigenous peoples to the NII, it should be done with an understanding of the appropriate ethical safeguards.

### D.4. Theory Building

The social theory for assessing these changes needs to be examined carefully. As a precondition of this, research should be undertaken that explores what is already known in various historical, social, linguistic, communication and cultural anthropological research about the dynamic relationship of mass communication technologies and societies that adopt them. This will enable researchers to infer potential impacts of the information infrastructure upon culture and society or assess actual innovations of such technologies.

“Market research and anthropological techniques are needed to identify groups with similar characteristics and needs and to identify the dimensions for describing groups that will be useful in predicting the impact of new technologies.”

—Arnold Lund

“We need better indices of telecommunications access to track the development of the NII and its social consequences. Such an index or indices should be quantitative [but also] grounded in an ethnography of media behaviors.”

— Milton Mueller



“Issues of access, privacy and dignity need much more attention, and social scientists are good at looking at broad societal concerns.”

—Bonnie Nardi

To what extent do the issues associated with the NII require new theories, and to what extent can we apply existing theories? The question of continuity and discontinuity needs to be addressed explicitly. Before inventing new theories, we need to assess the applicability of theories already devised by scholars in communications, political science, anthropology and sociology.



## **E** Illustrative Research Questions

As is evident, there are a large number of research issues. Given the multidimensionality of the topic, it is impossible to state any small set of research priorities. Nevertheless, it is useful to summarize examples of the types of research questions social scientists should be asking regarding this new sociotechnical reality:

- Who are the new citizens of the international 'net? Are they a creole population arising out of academic institutions and technical institutes, maintaining a secondary nationalism on the Web? Are they truly cosmopolitan? What do they portend for the stability of home and host governments?
- In the new media environment, what is the relative status of entertainment and other forms of culture? Is this a distinction that matters only to educated elites? Are entertainment values displacing other cultural values?
- How are the new telecommunications and computing technologies changing the nature of authority in public and private institutions? Are the face-to-face relationships of loyalty and authority breaking down? What is replacing them?
- Analog communications—through television, radio and fax—have changed the nature of political authority. Is digital communication, with its greater potential to extend and distort information, doing likewise? Will this increase opportunities for democratic participation or further alienate voters from public life?
- How prevalent are virtual communities? Do their members consider them a substitute for face-to-face communities? What would a comparative study of “real” and virtual communities look like?
- What are the critical characteristics that determine whether, with the advent of this new technology, a group adapts and adopts or is overwhelmed by the technology? Can critical indicators be identified?

- What are the requirements for the participation of social scientists in systems design? What are the indicators that such participation was successful?

Again, these questions are offered more as illustration than as priorities. Many similar researchable questions could be extracted from the workshop findings.



## **F** Conclusion

The NII is profoundly a social formation. Whether it is the “third wave” or a continuation of a 30-year trajectory of digital development is less important than recognizing that the NII will change the way Americans live, work, learn and consume. Understanding *how* American culture and society will change cannot, however, be deduced from the design of the technology. Rather, it requires a nuanced understanding of the complex interplay among design issues (protocols, network architecture, user interfaces and applications, among other considerations) and an array of social formations (groups, roles, statuses, values, collective representations and many others). Numerous design decisions—such as the relative upstream/downstream messaging capacity in different networks, performance standards for servers or priorities established in applications development—have clear social antecedents and important social consequences. The NII is not an autonomous, beneficent abstraction. It is an instrument, like many technologies, capable of great good or great harm that must be carefully designed with a knowledge of its social antecedents and consequences, if it is to result in the achievement of socially desired ends.

If the information superhighway is to unite America, then its construction must be illuminated and informed by the research and vision of the scientific understanding of society.



“High technology has the capacity to tear all of us apart as it brings some of us together.”

—Conrad Kottak

“A popular government without popular information or the means of acquiring it is but a prologue to a farce or a tragedy, or perhaps both. Knowledge will forever govern ignorance, and a people who mean to be their own governors must arm themselves with the power which knowledge gives.”

—James Madison

## Appendix A | List of Acronyms

<b>AAA</b>	American Anthropological Association
<b>CRA</b>	Computing Research Association
<b>FCC</b>	Federal Communications Commission
<b>IVR</b>	Interactive Voice Response
<b>NII</b>	National Information Infrastructure
<b>NSF</b>	National Science Foundation
<b>RBOC</b>	Regional Bell Operating Company

## Appendix B | Glossary

### ADVANCED INFORMATION TECHNOLOGY

*The assemblage of new technologies that has enabled broad public use of computing and digital communications, including, but not limited to, microprocessor-based computing, packet-switched networks, graphical-user interfaces, high-capacity transmission media, data compression and storage devices, including CD-ROM.*

### ANALOG COMMUNICATIONS

*The transmission of information through the modulation of the frequency (FM) or amplitude (AM) of an electromagnetic wave. Most current radio, television and telephone messages are through analog channels.*

### DATA COMPRESSION

*Any of several technologies for reducing the file size of digital information. Data compression permits more efficient storage and rapid transmission of digital information.*

### DIGITAL COMMUNICATIONS

*The transmission of information through binary (on/off) signals. The basic unit of information in digital communication is the bit, consisting of a single on/off signal.*

### DIGITAL LIBRARIES

*Networked or dial-up databases that permit remote access of library materials, including books, periodicals and pictures.*

### DISTANCE LEARNING

*Any of several technologies for transmitting instruction through text and images to remote (typically rural) locations. Most distance-learning technologies include real-time interactive capability between an online instructor and multiple learners at various locations.*

### ELECTRONIC COMMERCE

*The conduct of business coordinated through transmitting business information, including financial commitments, over computer networks.*

### INTERACTIVE VOICE RESPONSE

*Technologies that permit the storage, forwarding and playback of voice messages, including prerecorded messages and instructions*

*and the communication of instructions, through a telephone handset and touch-tone keypad.*

#### NATIONAL INFORMATION INFRASTRUCTURE

*The initiative by the U.S. government to promote the widespread availability of broadband communications and high-performance computing through the integration of multiple digital networks.*

#### PACKET-SWITCHED NETWORK

*A technology for transmitting digital messages by breaking the messages into message segments (packets) and routing the packets over available network connections. At the destination, the packets are reassembled into the original message image. Packet-switched networks have proven more robust than conventional land lines in disasters and other interruptions of analog telecommunications.*

#### TELEMEDICINE

*Technologies that enable the digital storage and transmission of medical information, including, but not limited to, patient records, diagnostic databases and real-time diagnostic images using remote sensing devices.*

#### VIDEO DIAL TONE

*A family of technologies for the digital transport of full-motion video signals to customer premises using advanced telephone infrastructure. Video dial tone enables subscribers to order video information through a set-top box without a cable TV subscription. Most video dial-tone architectures combine broadband downstream signaling (central office to customer premises) with limited upstream capability, used primarily for ordering and billing information.*

#### VIRTUAL ENTERPRISE

*A complete operation for the production and distribution of goods or services that is integrated through computer-mediated communication among multiple remote sites. In a virtual factory diverse functions such as order processing, materials management, labor reporting, accounting and assembly could be located in multiple remote locations and coordinated through a common data resource.*

## Appendix C | Reference

- Adler, Paul. 1986. New Technologies, New Skills. *California Management Review* 28(1): 9-28.
- Barnouw, Erik. 1975. *Tube of Plenty: The Evolution of American Television*. New York: Oxford University Press.
- Barnouw, Erik. 1978. *Sponsor: Notes on an American Potentate*. New York: Oxford University Press.
- Beniger, James R. 1986. *The Control Revolution: Technological and Economic Origins of the Information Society*. Cambridge, MA: Harvard University Press.
- Bennett, W. Lance. 1975. *The Political Mind and the Political Environment*. Lexington, MA: Lexington Books.
- Bennett, W. Lance. 1980. *Public Opinion in American Politics*. New York: Harcourt, Brace & Jovanovich.
- Bolter, J. David. 1984. *Turing's Man: Western Culture in the Computer Age*. Chapel Hill, NC: University of North Carolina Press.
- Branscomb, Anne W. 1994. *Who Owns Information?* New York: Basic Books.
- Conference on Behavioral Science and the Mass Media. 1968. *Behavioral Science and the Mass Media*. New York: Russell Sage Foundation.
- Cronin, F., et al. 1991. *Telecommunications Infrastructure's Contribution to Economic Growth*. New York: DRI/McGraw-Hill.
- Davenport, T.H. 1993. *Process Innovation: Re-engineering Work Through Information Technology*. Boston: Harvard Business School Press.
- Davidow, William H. 1992. *The Virtual Corporation: Structuring and Revitalizing the Corporation for the 21st Century*. New York: HarperBusiness.
- Deken, Joseph. 1981. *The Electronic Cottage*. New York: William Morrow & Company.
- Escobar, Arturo. 1994. Welcome to Cyberia: Notes on the Anthropology of Cyberculture. *Current Anthropology* 35(3): 211-231.
- Federal Privacy Protection Study Commission. 1977. *Personal Privacy in an Information Society*. Washington: Government Printing Office.
- Gurevitch, Michael. 1982. *Culture, Society and the Media*. London: Methuen.
- Hammer, Michael and James Champy. 1992. *Re-engineering the Corporation*. New York: HarperBusiness.



Hudson, Heather. 1984. *When Telephones Reach the Village: The Role of Telecommunications in Rural Development*. New York: Ablex.

Jones, Steven G. 1995. Understanding Community in the Information Age. In *CyberSociety: Computer-mediated Communication and Community*, ed. Steven G. Jones. Thousand Oaks, CA: Sage Publications.

Kidder, Tracy. 1981. *The Soul of a New Machine*. Boston: Little, Brown and Company.

Kottak, Conrad. 1989. *Prime-Time Society: An Anthropological Analysis of Television and Culture*. Belmont, CA: Wadsworth Publishing Company.

Lynd, Robert S. and Helen Merrill Lynd. 1929. *Middletown: A Study in American Culture*. New York: Harcourt Brace & Company.

Lang, Kurt and Gladys Lang. 1983. *The Battle for Public Opinion*. New York: Columbia University Press.

Lippmann, Walter. 1965 [1922]. *Public Opinion*. Glencoe: The Free Press.

Marx, Gary T. and Nancy Reichman. 1984. Routinizing the Discovery of Secrets: Computers as Informants. *American Behavioral Scientist* 27: 423-53.

Mander, Jerry. 1978. *Four Arguments for the Elimination of Television*. New York: Morrow.

McCombs, Maxwell E. and Donald L. Shaw. 1977. *The Emergence of American Political Issues: The Agenda Setting Function of the Press*. St. Paul, MN: West Publishing Company.

McLuhan, Marshall. 1964. *Understanding Media: The Extensions of Man*. New York: New American Library.

Majchrzak, Anne. 1988. *The Human Side of Factory Automation: Managerial and Human Resource Strategies for Making Automation Succeed*. San Francisco: Jossey Bass Publishers.

Pfaffenberger, Bryan. 1988. The Social Meaning of the Personal Computer, Or, Why the Personal Computer Revolution Was No Revolution. *Anthropological Quarterly* 61: 137-147.

Pool, Ithiel de Sola. 1983. *Technologies of Freedom*. Cambridge, MA: Harvard University Press.

Postman, Neil. 1985. *Amusing Ourselves to Death: Public Discourse in the Age of Show Business*. New York: Viking.

Rheingold, Howard. 1994. *The Virtual Community: Homesteading on the Electronic Frontier*. Reading, PA: Addison Wesley.

Sanders, E.B.-N. and E.H. Nutter. 1995. Participatory Design Practices: A Special Interest Group. In *CHI '95 Conference Companion*. Denver: Association for Computing Machinery.

Saunders, R. and B. Wellenius. 1994. *Telecommunications and Economic Development*. 2nd ed. Baltimore: The Johns Hopkins University Press.

Schrage, Michael. 1990. *Shared Minds: The New Technologies of Collaboration*. New York: Random House.

Segal, Howard P. 1985. *Technological Utopianism in American Culture*. Chicago: University of Chicago Press.

Segal, Howard P. 1994. *Future Imperfect: The Mixed Blessing of Technology in America*. Amherst, MA: University of Massachusetts Press.

Sklar, Robert. 1980. *Prime Time America: Life on and Behind the Television Screen*. New York: Oxford University Press.

Sproull, Lee and Sara Kiesler. 1991. *Connections: New Ways of Working in the Networked Organization*. Cambridge, MA: MIT Press.

Stoll, Clifford. 1995. *Silicon Snake Oil: Second Thoughts on the Information Superhighway*. New York: Doubleday.

Stone, Allucquere Rosanne. 1995. *The War of Desire and Technology at the Close of the Mechanical Age*. Cambridge, MA: MIT Press.

Strassman, Paul. 1985. *Information Payoff: The Transformation of Work in the Electronic Age*. New York: The Free Press.

Turkle, Sherry. 1984. *The Second Self*. New York: Simon and Schuster.

Weizenbaum, Joseph. 1976. *Computer Power and Human Reason: From Judgment to Calculation*. San Francisco: W. H. Freeman.

Zuboff, Shoshana. 1988. *In the Age of the Smart Machine*. New York: Basic Books.

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