

Communication, Community, and Intelligence in the Information Age

Introduction

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この数年、多くの論者によって、新しい情報技術が現在および将来にわたって家族、仕事、教育、ビジネス、余暇の過ごし方、などに与える影響が共通の視点から論じられてきた。

その多くは、コンピュータはこれからますます強力になり、より効率的に、またより多岐にわたって、現在と同じように人間の活動を支援するだろうと考えている。しかし、論者の中には、この等式を転換し、新たな世界では、機械が人間の知性と劣らない、異なった知性を有するようになり、人間がコンピュータ流のやり方に適応しなければならなくなるだろうと予測する向きもある。社会・技術的变化に興味をもつこれらの研究者によって展開される具体的なシナリオは大きく異なるが、これらの研究に通底するのは、向こう 10 年のデジタル技術における発展に続く変化が奥深いものとなるだろうという視点である。本稿では、近い将来に新しい情報技術によって地球上の社会にもたらされる影響を扱った論考から特に興味深いものを取り上げ、それを元に人間のコミュニケーションと生活のあり方における変化の本質と、その変化の範囲を記述することを試みる。

第 1 章では、技術革新によって生じた、また将来生じうる人間のコミュニケーションのあり方の変化に注目する。第 2 章では、これらの変化が、コミュニティの形と機能に関する我々の理解に対してどのような影響を与えるかを示す。第 3 章では、ネットワーク接続されたコンピュータが、人間の注意を要求する独特な知性を有するネットワークへ進化していくという視点を検討する。第 4 章では、本稿で紹介する著者たちが示した処方箋を概観し、個人とコミュニティがきたるべき変化に対して万全に備えるためにはどうあるべきかを論じる。

Introduction

In the last few years, many authors have shared their visions regarding present and future impacts of new information technology on families, work, education, business, and leisure activities. Most suggest that increasingly powerful computers will serve people in the same manner as they do today, only with much greater efficiency and in many more ways. However, some writers turn this equation around, anticipating a world in which machines develop a form of intelligence different from but not less than that of humans, with people having to adapt to the ways of computers. Although the particular scenarios unfolded by writers interested in socio-technological change differ widely, the single common thread running through nearly all of these works is that changes in the wake of advances in digital technology during the next decade will be profound. In this chapter I attempt to characterize the nature and scale of likely changes in the ways people communicate and live together by examining a number of the most intriguing perspectives on how societies across the globe might be affected by new information technology in the near future.

The first section focuses on current and probable changes brought on by technological innovation in the ways people communicate. Next I will describe how these changes might affect our understanding of the forms and functions of communities. In the third section I will discuss a perspective that sees networked computers evolving into networks featuring a unique kind of intelligence that will demand attention by humans. Finally, I will outline the prescriptions offered by the authors mentioned in this chapter and others regarding how individuals and communities might best prepare for the coming changes.

1. The Future of Communication

Advances in telecommunications technology over the past decade, particularly the exploding use world wide of the Internet, has prompted many observers to mourn the death of civility and community. The complaint arises from the recognition that it is no longer necessary, as it was some years ago, to meet face to face with others, at least occasionally, to accomplish many routine shopping, socializing, and information gathering tasks. It is possible, the argument goes, to spend one's life confined to a house with a computer and Internet connection. Supermarket goods can be purchased online and delivered to the door. The boom in email communications allows individuals to talk electronically without regard for distance or delivery time. There is even at least one church online, with daily prayers and hymns for the religiously

inclined with web access. Gone, the critics say, is public debate, the courtesies of greeting neighbors, support for local shop owners, and a sense of place and social identity traditionally facilitated by these public activities.

However, most of these critics ignore or de-emphasize the ways in which communications technology has expanded the communication choices and possibilities for many individuals and groups around the world. As popular Internet critic and entrepreneur Esther Dyson (1997) says, the Internet “is a medium for us to extend our intellectual and emotional selves.” She argues that widespread use of digital technology “is not going to push us into some antiseptic, digital landscape” and “will not change our basic characters” (p. 4). For Dyson, the Internet dramatically increases choices available for people to communicate, but does not by its availability alone determine the outcome of those choices. She points out that there are times when she prefers to mail a paper letter to a friend, and there are times when electronic transmission seems more appropriate.

Choice will be a prominent feature of new patterns of communication not only in that individuals can choose between using electronic or other means. Awareness of expanded choice as a result of advances in technology will permeate daily interactions between people and machines, individuals and individuals, and individuals and institutions. Many of these new opportunities will be due to recent breakthroughs in the miniaturization of digital components. Dertourzos (1997) describes how what he calls “ubiquitous computing” will take advantage of computer chips embedded seamlessly in nearly everything in a person’s environment, similar to the small computers that today monitor engine function in an automobile and the operations of some microwave ovens. People will be able to interact with these tiny computers by wearing “bodynets,” miniature, wearable electronic devices that will allow signals to be sent and received. An individual at home will be able to choose what kinds of advertisements, if any, are allowed into the family entertainment center by programming the system according to personal tastes. When the doorbell rings, a glance at a small monitor on the wall will not only show an image of the visitor transmitted by camera, but also the person’s name, affiliation, and purpose for visiting, which will be input at the door or gate via preprogrammed identification card. Based on this information, the individual inside the house can choose how or if to respond. Similarly, businesspersons or people meeting casually for the first time will exchange identification information using computer chips embedded in rings, watches, or bracelets. A physical handshake will enable a digital handshake, and the persons can choose how or if to continue contact while saving the information from the encounter for possible database storage.

Communication in the workplace will also be accomplished in a variety of means, depending on the situation. Although some companies and some employees, particularly those involved with production of physical goods, will choose to maintain the traditional system in which workers commute daily to a central location, many others will have the option of working at least on some days from home or from remote work stations. According to Cairncross (1997), telecommunications advances will promote a “death of distance” leading to increasing mobility and transforming both the workplace and the home. In many cases, she sees the central office becoming something like a club in which workers can socialize and conduct particular face to face interactions that can’t be accomplished electronically. Homes, in contrast, will have fully functioning offices with highspeed Internet connections, and families will have a huge range of services available to them online, from education to banking to being able to monitor the health of a grandparent who lives across town.

Dertouzos (1997) refers to the choices that increasingly will be available to citizens of the next decade as the “information marketplace.” He defines this emerging social system as “the collection of people, computers, communications, software, and services that will be engaged in the intraorganizational and interpersonal informational transactions of the future” (p. 10). But a viable information marketplace, Dertouzos argues, must have a solid infrastructure that has at least four central qualities: it must be widely available, easy to use, scaleable, and make possible numerous independent activities (p. 16). Today, two of these conditions are met with reasonable strength. Computers are widely available and information networks are scaleable, but computers are not yet easy enough for most persons to use efficiently or effectively and generally do not simultaneously facilitate the work of multiple tasks. To help remedy these two drawbacks, the author suggests that voice recognition capabilities will need to be developed so that a user can simply command a computer to carry out a certain function. The goal, he writes, is to have computers communicate as humans do to the greatest extent possible. By this Dertouzos is not claiming that computers will need to be able to think like humans, but instead will need to interact with humans in a more human way.

More than many other aspects of life, education is likely to undergo profound transformations through cooperation between people and such intelligent machines. Dertouzos believes that, because teaching and learning fundamentally involve the creation, transfer, and management of information, the information marketplace will make possible innovative reforms such as distance education on a wide scale. However, as with the availability of increased options in the workplace, home, and in public spaces, choices in

education likely will remain and expand as communication technology develops. Choice also will be a powerful feature of coming changes in the forms and functions of communities. In the following section I will discuss what some of these changes might look like.

2. The Future of Communities

Along with new ways of communicating--person to person and person to machine--will come new conceptions of community. Before the Internet became popular among the general population, the notion of community was associated mainly with physical location. For example, reference to the Amish community was connected to a rural section of Pennsylvania where the Amish tended to live. In many big cities in the United States, mention of the Chinese community or Black community tended to call to mind a particular area of the downtown core where these groups had businesses and lived. But "community" has long had another meaning as well. The Catholic church, and perhaps some other religious groups have referred since biblical times to the "community of believers," a reference not to a physical area but instead to people anywhere who share the values and beliefs of the group. Similarly, reference of the "gay community" in the United States usually refers to gays and lesbians anywhere who identify themselves socially or politically with each other. This conception of community, groups of individuals who share and pursue common interests or values, is becoming increasingly relevant as communications technology makes physical distance and location less of a barrier to interaction. Today there are hundreds of communities that use Internet news groups as spaces for discussion of issues of shared interest, and listservs generally dedicated to a particular topic connect and often encourage interaction between individuals via electronic mail.

The ability to create communities of interest regardless of physical location does not mean, however, that physical proximity has or will become meaningless. Instead, it is likely that there will be increasingly more choices available to persons wanting to contribute to communities, both local and non-local. For example, advances in telecommunications technology has given birth to what Henton, Melville, and Walesh (1997) call "economic communities." Economic communities "are places with strong, responsive relationships between the economy and community that provide companies and communities with sustained advantage and resiliency" (p. 5). Based on the decentralization and specialization made possible by new telecommunications tools, these communities can and must have global reach, but at the same time they draw strength from local talent, information, and carefully organized alliances between businesses, government and

institutions. The authors point out that any given region has particular strengths, weaknesses and resources, and the critical task for economic communities is to recognize these factors and cooperate with other communities to create maximum benefit for all. Spretnak (1997) also argues that what she calls “community-based economics” keeps money generated by activities within a city or region circulating within that same area, which contributes locally to stability and security. The alternative, which she claims is being promoted by many conceptions of a “global economy,” results too often in the transfer of wealth out of communities through the purchase of goods from non-local mega-retailers.

The availability of electronic means of interaction, both local and non-local, in addition to face-to-face interaction in local communities will put a premium on the same qualities that have always supported communities: trust, openness, and shared rules for communicating. Dyson (1997) emphasizes the importance of “voluntary visibility,” even though technology makes possible anonymous interactions. Such transparency is necessary, she argues, for creating trust among community members, some of whom have never and may never meet physically. According to Dyson, communities of interest also will have choices to make regarding copyright issues. She envisions particular communities within which it will be acceptable, based on agreement, to use the creations of other community members without concern for violating copyright. However, these same communities probably will not approve of the free use of intellectual property generated from outside the community. In this way, different communities will develop and adhere to different norms for dealing with issues such as content control.

Underlying the ways in which these new forms of community will emerge and thrive is what Esther Dyson's brother George Dyson (1997), calls “symbiosis.” Symbiosis is a beneficial relationship based on mutual rewards between potentially antagonistic entities. The role of the government in economic communities, for example, might be facilitated by what Henton, Melville and Walesh (1997) refer to as “civic entrepreneurs,” whose central task is to forge collaborations between the various interests that comprise the community. These authors see a trend toward the increasing downsizing of governments, with burden of responsibility and oversight being shifted to the level of local communities. The new model will reflect a “declaration of interdependence” between business, government and civil society. An example of the likely future of communities is what occurred over a number of years in Silicon Valley, California. In 1992, the economic outlook for the region was dismal. The bleak situation prompted the formation by some forward-looking citizens of Joint Venture-Silicon Valley, a collaborative effort between government, business, education, and other community groups to turn the

community in a positive direction. Employing both a top-down and bottom-up process, consensus was reached on primary goals for the area, resulting in the strong community in place today.

Another notable example of an innovative approach to wedding a variety of interests in a healthy collaborative enterprise facilitated by advanced communications technology is the Blacksburg Electronic Village (BEV) in the state of Virginia, USA. Founded at a conceptual level among graduate students and faculty at the Virginia Polytechnic Institute in 1991 and put into operation in 1993, today BEV is a town of 36,000 residents, more than 60% of whom access the Internet from their homes on a regular basis. The project involves public-private collaboration between three main partners: the town government, Bell Atlantic of Virginia, and the Virginia Polytechnic Institute.

According to Cohill and Kavanaugh (1997), editors of "Community Networks: Lessons from Blacksburg, Virginia," each of these partners has both invested much and gained much from the project. Bell Atlantic has learned what is involved in creating and managing a telecommunications infrastructure appropriate for such communities, experience that can be applied to the many other similar communities likely to follow the example of BEV. The University has benefited from research opportunities, and has incorporated lessons learned from the project into the undergraduate and graduate curriculum. Finally, the city of Blacksburg has enjoyed economic development as a result of the project, including the addition of 18 new ISPs to the area.

The editors of the book write that one of the lessons learned from BEV is that, contrary to the fears of many social critics, being connected locally with Internet access has not led to the death of community. In fact, as Esther Dyson, Cairncross, and others have argued, the Internet provides the residents of BEV with one more rich and powerful option for socializing and communicating. For example, school children in the town publish their school work on the BEV home page (<http://www.bev.net/>), and citizens interested in issues such as food or car repair participate frequently in electronic forums devoted to these topics. Another lesson learned is that to encourage local businesses to get involved online, incentives are probably necessary. In 1993 BEV began offering a free, online business card listing service to businesses in the area. Few businesses took advantage of the opportunity, but when BEV got a home page in 1994, 40 companies got online by the end of the year. As web service companies moved into Blacksburg to attempt to attract customers, there were 100 business card listings on the BEV web site by the end of 1995, and at the end of 1997 250 local businesses, or 70% of all businesses in the area, were advertising online. Today, local businesses continue to get a

business card listing free for one year, after which time they can choose to drop the listing or maintain the listing by paying an ISP for service.

Insight into the social value of the BEV project can be gained by noting what is featured on the front page of the BEV website at any given time. Announcements as of May 3, 1998 include the recent decision by a developer of apartment building complexes in the Blacksburg area to put high-speed ethernet connections in every bedroom of all 108 4-bedroom apartment units now under construction at one site. The same developer plans to do the same thing in 1500 additional apartments slated for construction over the next year. Other notices on the front page of the web site concern summer camp registration for area youths, a college entrance examination study service, information about the Blacksburg high school class of 1988 reunion, free senior citizen health information, and an advertisement encouraging persons of retirement age to consider the Blacksburg area. Notice that these public notices reflect the interests of all three main parties collaborating on BEV and their active participation in the system. It is likely that BEV will be recognized as a model for many future communities in the Information Age.

In the next section, I will describe how both the future of communication and the future of communities might be impacted by what some authors believe is an evolving form of intelligence among networked computers and other digital machines. Although this idea and the potential consequences that follow from it are not yet well developed in the literature, the authors I mention below argue that there is biological precedence and other forms of evidence supporting their claims.

3. The Evolution of Machine Intelligence

If future changes in forms and functions of communication and community are inextricably linked to technological advances in information networks and devices, then it is important to consider the particular ways in which machines and their capabilities are evolving. Moore's Law, which predicts an approximate doubling of computer chip performance every 18 months, is one simple measure of the outcome of advances in digital technology but does not lend insight into the root operations of such changes at the systems level. Instead, some observers believe that there is a profound evolution underway, similar in process to previous forms of evolution, that is beginning to unfold quietly but surely.

Bailey (1996) predicts that computers soon will participate in what he

calls “bit evolution,” an inevitable process that will endow some machines with intelligence very different from but on par with human intelligence. Referring to bit evolution as a third evolution following biological and cultural evolutions, Bailey describes how electronic circuits are especially good at moving from millions of small parallel operations to higher levels, which emerge from the sophisticated combination of individual bits that carry with them understanding of previous work. Whereas the pace of biological evolution is constrained by the slow pace of genetic evolution, and the pace of cultural evolution is constrained by the limited abilities of humans to process and strategically forget information, the pace of bit evolution will be incomparably faster because of the vast amount of data available to electronic circuits, and the facility they have for sharing and effortlessly deleting data when necessary. According to Bailey, bit evolution will become autonomous, just as cultural evolution is autonomous from biological evolution, as already evidenced in primitive form by computer application installation software that can assess the present condition of a machine and make decisions regarding what steps should be taken to effectively complete the installation process. He also points out that humans will learn increasingly to depend on the judgment of computers. For example, during such software installations, the human user generally trusts the computer to install and replace software appropriately.

One important quality of electronic circuits that will be critical for bit evolution is what Bailey (1996) refers to as “first access” to data. Even today, machines generally have access to most data before humans do. For example, large telescopes transmit images first to computers, which process this information in ways scientists can understand. Modern airplanes use computers attached to radar to sense the presence of other aircraft long before the human eye could possibly detect such objects. Even using a bank cash machine requires that the computer access and process the user’s bank account information before relaying it to the user. The privilege of first access to data allows machines to make decisions that may or may not be favorable to the user, such as when a bank cash machine detects insufficient funds in an account and refuses to allow a user to withdraw cash. In Bailey’s vision of the future, computers incapable of thinking like humans but proficient at their own unique ways of thinking will surely become more likely to influence and wield control over our daily lives.

Similar to Bailey, George Dyson (1997) likens the evolution of machines to Darwinian processes. But Dyson focuses more on the cooperation between humans and computers that is driving machine evolution. As Darwin did, Dyson sees an orderly progression of advancement interspersed with some randomness. In this progression a certain collective intelligence develops, with the weaker elements of software being weeded out after trial runs in the digital

environment. The primary drive of all forms of intelligence, he argues, is to organize. One form of organization particularly suited to successful evolution is symbiosis, which I described above as a mutually parasitic relationship between two organisms. According to Dyson, the increasing symbiosis between machines and humans is due to the recognition by humans that the advantages to society of advanced telecommunications technology are sufficient to invest long term in this collaboration. If it is frustrating to have a computer refuse to allow a user to withdraw funds from a bank cash machine, or to be subjected by a computer to a long list of options before being able to request information by telephone, or to endure multiple computer system crashes with attendant loss of data, apparently we have decided to pay this price in return for relatively far more rewards.

Dyson also warns that it is foolish to imagine that the definition of “intelligence” should be restricted to those processes that humans totally, or at least mostly, understand. Like Bailey, Dyson emphasizes that machines and humans have very different kinds of intelligence, and that human intelligence is not “better” than that of machines, but rather better suited at particular tasks, just as computers are better suited at others. For example, humans designed the World Wide Web, but Dyson predicts that this primitive configuration of distributed intelligence will be replaced by more intelligent forms in the near future, and that machines may be the driving force behind these changes. That there will be continued symbiosis between humans and machines is certain, but the particular roles humans and machines will play in the development and evolution of future telecommunications systems and global intelligence is not yet known.

4. Suggestions for Living in the Information Age

Having surveyed some prospects for changes in patterns of communication and community as the Information Age dawns, it is valuable to imagine how individuals, groups and societies might best prepare for these changes. As Bailey (1997) argues, whether we prepare them for it or not, children born today will grow up in a world in which they are outnumbered by computers. Perhaps most critical will be a reconsideration of the fundamental nature of the relationship between humans and computers. Based on the results of 35 studies that suggest that people interact with computers in the same ways that they interact with other people, Reeves and Nass (1996) suggest that use of language is key to forging recognition of the interdependence of machines and persons. For example, rather than refer to computer “wizards” or “tools,” the notion of “teamwork” should be stressed. Such teamwork might require that messages by computers be reformulated to

sound more polite, using “please” when possible to reflect a spirit of cooperation. Reeves and Nass also propose, based on their findings, that the relationship between humans and machines could be made more comfortable and productive if machines were designed to interact in more human ways.

Reforms of educational institutions also will be important. Dertouzos (1997) claims that schools, particular high schools and universities, will need to teach in a way that does not artificially separate humanistic and technological concerns. Examples might include advances in distance learning approaches, and the development of computerized tutors that can respond to the individual needs of learners. However, observers of the BEV project point out that computers by themselves have little or no impact on learning. There will need to be skilled guides to encourage students to interact with computers in stimulating and effective ways. One idea for educational reform in the Information Age is what Henton, Melville and Walesh (1997) refer to as “leadership academies.” These institutions should not be run on the prevailing model of leadership courses often found in colleges and universities that stresses development of general leadership skills. Rather, the authors say, such academies should focus on the situation--particularly the economic situation--in the specific community in which the graduates will work and live, and on the specific tools and skills these individuals will need to be catalysts for change in these communities.

Finally, Esther Dyson (1997) proposes a series of what she calls “rules for living” in the Information Age. She is careful to point out that these “rules” are not meant to be applied in the same way by everybody, but rather to be basic principles for moving in a positive direction. These principles include trust, honesty, participation, disclosure, clarity, respect for oneself and others, and judgment. Trust should not be blind trust. Dyson suggests verifying suspect information or identities by using authentication tools when possible. Honesty, generosity, and a sense of humor are important for creating and maintaining a spirit of cooperation. Disclosure is also important for community-building, because it is difficult to trust somebody if that person is unwilling to reveal their actual identity. Using good judgment is recognition that telecommunications technology does not change basic human behavior. The choices that the Internet and other computer-mediated forms of communication make possible include expanded potential for doing good or doing wrong. Dyson believes that it is everybody’s responsibility to do the most good and least wrong, a goal she hopes can be facilitated by following the principles she outlines.

Conclusion

A central theme of this chapter has been “choice.” As information technology continues to develop at ever faster rates, all of us will be faced with increasing options in our daily activities. Usually these choices will be welcome. With respect to communication, having the ability to send information to one friend, a group of twenty, or potentially to millions of people is a form of empowerment not widely available a decade ago. In addition to scope, communication technology empowers individuals by providing a range of performance and experiential modes. Today I can get the latest world news electronically by radio, television, web page via text or web page via audio file, and my decision can be based on efficiency, aesthetics, comprehensiveness, or my mood at the time. Sometimes, however, communication-related choice is less welcome. A good example is the thousands of links to information often generated by Internet search engines in response to a single query. It is likely that future search engines will be able to provide a better balance between amount and quality of data presented to the user.

Choice associated with communities of the future will have similarly mixed advantages and disadvantages. Hopefully, the computer-mediated availability to anybody in the world of countless communities of interest--some rooted in physical location and some not--will be an overwhelmingly valuable resource for human growth and learning. Particularly for poor, sick, elderly, or disenfranchised individuals and groups, the potential for contact with others, often regardless of location or time, should continue to bring great benefit to all concerned. But involvement in communities exposes participants to risks as well as rewards. Following Esther Dyson's (1997) advice, community members in the Information Age will need to cooperate and use good judgment to reduce the increasingly sophisticated potential for harming individuals and institutions made possible by advanced technology. The development of community area networks such as the BEV project, in which physical location provides a starting point for the construction of a high-speed communication networks linking individuals, schools, businesses, governments, religious organizations and civic groups to facilitate the sharing of information, seems to be one good choice.

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