On the cathode-ray tube in front of her flashes an image of an envelope with a handwritten address—upside down. The woman touches the keyboard, flipping the picture 180 degrees. She reads the sloppy script and presses several more keys. The image vanishes and another appears in its place. The whole process has taken perhaps four seconds. Around her in seemingly endless rows of work stations sit other clerks, male and female, from their early twenties to early sixties, most with high school educations or better, silently staring at their screens, engaged in the same repetitive task: reading the addresses that the U.S. Postal Service computers cannot decipher, sending correct information back to distant post offices where bar codes will be attached.

"We handle no physical mail here at all," the plant manager proudly explains. "The images arrive over phone lines from central post offices in Connecticut, Massachusetts, and New York, are stored in four mainframe computers and then distributed to our 485 workstations. Yesterday we set a new record for this facility: 3,100,000 pieces processed in a single day, most of it Christmas cards in the seasonal rush."

The Remote Encoding Center, located in a large, windowless warehouse in Latham, New York, is fairly typical of work sites that now greet ordinary working Americans. Although operated by a government agency, the plant is organized by the logic of cost-cutting, technological dynamism, global communications, economic competitiveness, and flexible social relations that also characterizes private sector production in the late-twentieth century.
One of sixty-five such centers in the United States, it has been in operation for two years. Whether it exists for, say, another three years depends on how efficient it is as compared to its sister centers around the country. Since nothing about its work depends upon a specific geographical location, it could just as well process images of mail from Georgia or Oregon. By the same token, sites in the west and south could handle the work done in Latham. "So far we have an excellent record for productivity. Our employees know that unless we perform better than similar sites, these jobs will go elsewhere."

Eventually, the jobs will vanish in any case. As pattern recognition software incorporates the latest developments in artificial intelligence, the human contribution is quickly whittled away. Within a few years computers will be able to read the vast majority of the items the clerks now handle. Our guide assures us that the employees understand that even in the best of circumstances, their jobs have short horizons. Hiring policies at the center presuppose the ephemerality of the work. Of the eight hundred people the center employs, only a quarter are "career" postal workers with benefits and pensions. The rest are temporaries, slotted into four- to six-hour shifts. Welcome to the digital age.

The mood in the enormous work room is sober, bordering on grim. Although their activities depend on sophisticated communications equipment, there seems to be little communication among the clerks. Able to come and go as they please in pre-arranged, round-the-clock, flex-time schedules, they file into the building, stopping briefly at the coat room, clocking in and with plastic swipe cards, quietly taking a seat at a work station, logging into the computer. There is seldom any need to talk to another person all. In the brightly lit "cafeteria" in an adjoining room, there are only food vending machines with several tables and hardback chairs for those taking their five-minutes-per-hour break. Nothing about the space invites social gatherings or conversation.
As I wander among the workstations watching the clerks dispatch one image after another, I notice several cardboard cartons filled to the brim with AA batteries, discarded by workers, many of whom wear head phones connected to Walkman and Discman stereos. Each one listens to his/her own music—rock, rap, country, jazz, classical—to help the hours pass. There they sit, side by side, fingers gliding across the keyboard—alone together.

Digital Technology as Cultural Solvent

The visit to the Remote Encoding Center left me deeply conflicted. Should I be thankful that several hundred workers are earning decent wages—$12.00 an hour on average—in steady work that, back strain and carpel tunnel syndrome aside, most of them find fairly agreeable? Or should I yield to my basic instinct and recognize that when all is said and done this is numbing, stifling work, devoid of creativity, suppressing everything vital and interesting in the individual? Should I despair at the prospect that all of it will be electronic landfill within a decade? Or should I anticipate, as my engineering students always do, that much better jobs will be available in programming the next generation of machines?

For most people who think about the role of technological change in human well-being, such conflicts count for little. In our society the prevailing view stresses economic results to the exclusion of all other concerns. New instruments, techniques, and systems are seen as inputs that go into the hopper of material production and are mixed with other ingredients—education, marketing, government policy, and so forth. What comes out the other end is what businessmen, politicians, and economists uphold as most basic of social goods: economic growth. From this standpoint, we know we are doing well as a society when technological innovation contributes to a gradual increase in incomes, profits, stock prices, and living standards.
What the conventional view lacks, however, is any notion of technological development understood as a complex social, cultural, and political phenomenon. This is not an obscure or mysterious topic. Every thoroughgoing history of technological system-building points to the same conclusion, namely that technical innovations of any substantial extent involve a reweaving of the fabric of society, a reshaping of some of the roles, rules, and relationships that comprise our ways of living together. In this process, many people in many different situations contribute to the kinds of final outcomes we talk about as inventions or innovations. Of course, new material instruments and techniques are never the sole cause of the changes one sees. But the creation of new technical devices presents occasions around which the practices and relations of everyday life are powerfully redefined, the lived experiences of work, family, community, and personal identity, in short, of some of the basic cultural conditions that make us "who we are."

At some level most people appreciate that new technologies are involved in changing the practices and patterns of everyday life. But most find it difficult to talk about this, much less to move the social, political, cultural, and ethical considerations about technological transformation to the center stage of public debate. We realize that the technologies that surround us affect matters we deeply care about—the satisfactions of working life, the character of family ties, the safety and friendliness of local communities, the quality of our interactions with schools, clinics, banks, the media, and other institutions. But finding ways to deliberate, organize, or act on these intuitions is not part of our education or our competence.

Today the solely economic perspective on technological change seems increasingly hollow because it fails to illuminate forces and circumstances of crucial concern to a great number of people, both in our society and in many other parts of the world; forces and events starkly evident in places like the Remote Encoding
Center. On most lists, the key elements of this transformation include the following:

- To an increasing extent, the basis of wealth no longer depends, as it did in modern industrial economies, on access to material resources. Instead, wealth derives from applications of brainpower to the creation of marketable goods and services (Thurow, 1996).

- Productive operations now presuppose "global" extension in which the capital, information, expertise, and labor of any organization can be spread across several nations, regions, or continents and yet operate effectively in real time (Casells, 1996).

- Tried and true patterns of factory organization and corporate bureaucracy perfected throughout much of the twentieth century are being replaced by organizational principles of a much different sort. Organizations are reengineered to achieve flexibility, agility, and leaniness, adapting their processes to suit closely the needs of their customers (Hammer and Champy, 1993).

- Because production facilities must turn on a dime, quickly altering what is produced and how, workers must be prepared for dramatic shifts in what they do. They too must be flexible and customer-oriented, employed within temporary teams with ever-changing objectives (Warne et al., 1992).

- Finally, one sees the continuing digital transformation of and astonishingly wide range of material artifacts and associated social practices. In one location after another, people are saying in effect: Let us take what exists now and restructure or replace it in digital format. Let's take the bank teller, the person sitting behind the counter with little scraps of paper and an adding machine and replace it with an ATM accessible twenty-four hours a day. Let's take analog recording and the vinyl LP and replace it with the compact disc in which music is encoded as a stream of digital bits. Or let's take the old-fashioned bookstore and transform it into a site on the
World Wide Web where people can read reviews and browse through the best-seller lists. The possibilities are limitless (Winner, 1996a, 1996b).

Taken together the transformations I have noted amount to a massive, ongoing social experiment whose eventual outcome no one fully comprehends. During the past two decades American workers have achieved steady increases in productivity, using a host of new tools and techniques. But except for incomes of perhaps the top 20 percent of the nation's populace, ordinary people have not seen the fruits of transformation return to them as an improved quality of life. In fact, during this period the average wages for Americans in the middle and lower levels of our society have declined. As innovations in computing, communication, and flexible production have multiplied, people see many of the jobs and workplaces that formerly sustained their way of life abruptly terminated or moved offshore. Whole categories of employment—telephone operators, accountants, secretaries, and many kinds of factory workers—have dwindled or expired. Those displaced from their former vocations often find that they must hold two or three jobs to maintain a middle-class standard of living (see Uchitelle and Kleinfeld, 1997). Most employees at the Remote Encoding Center, for example, take the work as a second job to supplement their incomes.

Of course, the consequences of such changes go far beyond the problem of sagging incomes. Even those who retain their jobs face anxiety about the immediate future. Recent polling data suggests that large numbers of people think the economy is "improving" nonetheless fear that they will soon lose their jobs (Lohr, 1996). To an increasing extent, the technological world of the late twentieth century is one that everyone is made to feel expendable.

Along the way many practices long associated with loyalty at work, stable families, and a sense of belonging in coherent communities no longer count for much. Sources of support for the institutions of civil society—schools, youth groups, churches, ser-
vice clubs, and charitable organizations—dwindle because both employers and former employees have less time and money to give. As one of top five companies in the Fortune 500 withdraws from the city that was once its mainstay, it finds that it can no longer afford to sponsor a local little league team.

In this process many of the agreeable textures in the common life of earlier periods are eviscerated or placed under stress. In places formerly occupied by human beings and predicated on social interaction, we now find sophisticated hardware and software; the ATM and voice mail are notable examples. None of us can escape the influence of these systems, regardless of what we may think of them; for as we interact with these devices, our behaviors are automated as well. In America and other nations affected by globalism and the rise of a society based upon digital encoding, many of the roles, institutions, and expectations that were serviceable in previous decades are no longer welcome.

Technological Drivenness and Social Construction

For those who recognize how thoroughly our ways of living are intertwined with technical devices, evidence of change—even change that at first seems ominous—can be cause for hope. If it were possible to reflect upon and act intelligently upon patterns in technology as they affect everyday life, it might be possible to guide technocultural forms along paths that are humanly agreeable, socially just, and democratically chosen. For that reason, many intellectuals, activists, and artists now seize upon technological innovation as an arena in which humane, democratic conditions might be fostered. A good number, this writer included, are concerned to find approaches and strategies that might place technological choices at center stage.

The dominant perception of technology and culture, however, is not one that gives much credence to this hope. From every corner we are advised that far from broadening the options open to us, technological developments characteristic of the late twenti-
eth century constrain our choice, forcing society in a particular direction, allowing no significant modification or appeal. One hears politicians, businessmen, and ordinary people exclaim that because technology in the late-twentieth century is moving in a particular direction, there is no alternative but to lay people off, close plants, dismantle institutions once crucial to the vitality of local culture, alter practices of schooling, adapt our patterns of family life, and so on. True, we may not have chosen the changes of our own volition. But we have no choice but to adapt and join defined by rapidly moving instrumentalities and organizational demands of today’s high tech economy.

Thus, journalist Steward Brand exclaims in Wired, “Technology is rapidly accelerating and you have to keep up. Networks and markets, instead of staid old hierarchies, rule, and you have to keep up” (Brand, 1995, p. 38). Michael Hammer, leading advocate of “reengineering,” surveys the social disruptions brought by the new “process-centered world,” and concludes, “It is the inevitable result of technological advances and global market change. The question that we must confront is not whether to accept it but what we make of it” (Hammer, 1996, p. 265). In fact, the sheer drivenness of technological development is commonly held out to people as a bracing moral challenge, one that will test their character. Whether one succeeds or fails will depend upon how well one reads the powerful trajectory of social and organizational changes and positions oneself accordingly (Burrus, 1993).

Among sociologists and historians who study technological change, there is a jarring irony here. For within today’s scholarly communities, once-popular notions of technological inevitability, determinism, and imperative have gone out of fashion. Three or four decades ago, debates about technology and society often focused on what were widely (but by no means uniformly) believed to be essential features of technology and technological change. Many economists, historians, and social theorists argued that the development and use of technology followed a fairly uni-
linear path, that technological change was a kind of univocal, determining force with a momentum and highly predictable outcomes.

There were optimistic and pessimistic versions of this notion. Among social scientists one influential group espoused what was called “modernization theory,” the belief that all societies move through stages of growth, or stages of development linked to technological sophistication and social integration such that eventually they would reach what was called the “take-off point” and achieve the kind of material prosperity and way of life found in late-twentieth-century Europe and America—all to the good (see, for example, Rostow, 1960). There were also pessimistic variants of this conception, theories of technological society that focused upon the human and environmental costs of rapid technological development, for example the visions presented in Jacques Ellul’s The Technological Society (1964), Herbert Marcuse’s One-Dimensional Man (1964), and Lewis Mumford’s Myth of the Machine: The Pentagon of Power (1970).

Whether taken in optimistic or pessimistic variants, there was something of an agreement that modern technology had certain essential qualities, among which one could list a particular kind of rationality—instrumental rationality, the relentless search for efficiency—and a kind of historical momentum with indelible features that rendered other kinds of social and cultural influences upon the character of social life far less potent.

During the past twenty-five years there has been an enormous effort to show that the idea that modern technology is a unilinear, univocal force is completely erroneous. Instrumental devices, systems, and techniques as well as the ways in which they are used and interpreted are always subject to complicated “social shaping” or “social construction.” Looking closely at how technologies arise and how they are affected by the contexts that contain them, one does not find a juggernaut foreordained to achieve a particular shape and to have particular consequences, but rather a set of options open to choice and a variety of contests over which
choices will be made. Debunking work of that kind has been undertaken by European and American social scientists, historians, and philosophers. One purpose of this work is simply to provide a more faithful account of how technological innovation and associated social change actually occurs. Another goal is to snatch human choice from the jaws of necessity, to redeem the technological prospect from both the facile optimism of liberal, enlightened thought and the pessimism of cultural critics. Hence, an endless array of case studies and social theories now proudly affirm voluntarism in technological change in contrast to notions of determinism.

How ironic that at the very moment that notions of contingency and social construction of technology have triumphed among social scientists and philosophers of technology, in the world at large it appears that the experience of being swept up by unstoppable processes of technology-centered change is, in fact, stronger than it has ever been. Social scientists may call them naive, but the perception that institutions and individuals are driven by ineluctable technological change is fairly widely embraced among those who work in fields of computers and telecommunications. One of the founders of Intel, Gordon Moore, formulated Moore's Law, which states that the computing power available on a microchip doubles roughly every eighteen months. Writers on computing and society have seized upon this as the basis of their common perception that social change is now propelled by necessities that emerge from the development of new electronic technology and from nowhere else.

Writings on the emerging global economy seem similarly oblivious to the new vision of historically contingent, socially constructed, and endlessly negotiable technical options. In Lester Thurow's book *The Future of Capitalism* (1996), for example, we learn that technological change is one of the "tectonic forces" that we can only recognize and obey but not hope to master. Notions of this kind are echoed not only in the statements of businessmen and economists, but also in reports of engineering pro-
professionals at work in fields of fast-moving technical advance. In his study of the use of expert systems in industry, Todd Cherkasky notes that persons actively involved in developing and using such systems often talk in almost Ellulian terms, as if the phenomenon had a life of its own, one that transcends anyone's intentions. Even those at work on the cutting edge of research and development often talk about "where the technology is headed," suggesting that they are merely running to catch up with a process that has its own trajectory and momentum (Cherkasky, 1995).

Similarly, the literature about technology and business advises organizational restructuring and reengineering, not so much in response to technological changes upon us now, but restructuring that anticipates technological changes and acts far in advance of expected breakthroughs. In business consultant James Burrus's book *Technotrends*, there is strong advice that whatever one's focus of production is today, one must liquidate it and begin retooling in ways that incorporate new and exotic ways of achieving the same objectives. "Render your cash cow obsolete (before others do it for you)," he insists (1993, p. 353).

In writings about computers, networks, the global economy, and social institutions, there is a strong tendency to conclude that rapid changes in technology and associated developments in social practice can only be described by a reformulated evolutionary theory, a theory of biotechnical evolution. Notions of that kind inform the speculations of the Santa Fe Institute about the emergent properties of complex biological and artificial systems. Summarizing implications of this way of thinking and applying it to contemporary development in the spread of networked computing, Kevin Kelly, editor of *Wired* magazine, concludes, "We should not be surprised that life, having subjugated the bulk of inert matter on Earth, would go on to subjugate technology, and bring it also under its reign of constant evolution, perpetual novelty, and an agenda out of our control. Even without the control we must surrender, a neo-biological technology is far more
rewarding than a world of clocks, gears, and predictable simplici-

ity” (Kelly, 1994, p. 472).

In visions of this kind, one again affirms faith in the benefi-
cence of an autonomous historical process. In Kelly’s view and
those of similar persuasion, the choice is neither possible, nor
desirable. In fact, attempts to impose external standards of choice
upon the internal processes of biotechnical evolution can only be
destructive.

In sum, the hope of social scientists and philosophers that argu-
ments about social construction and contingency in technological
development would secure the domain of open deliberation and
choice is to a considerable extent contradicted by a range of expe-
riences, perceptions, theories, and strongly advocated moral
lessons prominent among those directly involved with and excit-
ed by technological development in our time. Far from embrac-
ing the promise of humane, voluntaristic, self-conscious,
democratic, social choice-making in and around technology, a
great many observers have—for reasons they find compelling and
completely congruent with their lived experience—cast their lot
with ideas that reject or even mock choice-making of that kind.

_Utopian Dreams_

Descriptions of our civilization’s sheer technological drivenness
are apt to strike some observers as chilling. After all, where in this
picture is there any attention to the environmental effects of a
global economy geared to limitless expansion? Where in this “out
of control” dynamism is there any care to nurture a humane civic
culture and democratic governance?

Yet many who survey the situation do not find it appalling in the
least. Yes, they may admit, the world is technologically driven, but
its trajectory leads to favorable destinations. In fact, some are
inclined to say, a new utopia is at hand.

Expectations of this kind are nothing new. Since the earliest
days of the Industrial Revolution, people have looked to the lat-
est, most impressive technology to bring individual and collective
redemption. The specific kinds of hardware linked to these fantasies have changed over the years: steam engine, railroad, telegraph, telephone, centrally generated electrical power, radio, television, nuclear power, the Apollo program, and space stations—all have inspired transcendental visions. But the basic conceit is always the same: new technology will bring universal wealth, enhanced freedom, revitalized politics, satisfying community, and personal fulfillment. In 1856, for example, Denison Olmsted, professor of science and mathematics at Yale, wrote that science (by which he also meant what we call technology) "in its very nature, tends to promote political equality; to elevate the masses; to break down the spirit of aristocracy" (Olmsted, 1975, p. 144). Decades later, similar anticipations were inspired by the coming of the airplane. As historian Joseph Corn summarizes the "winged gospel" of aviation of the 1920s and 1930s, "Americans widely expected the airplane to foster democracy, equality, and freedom; to improve public taste and spread culture; to purge the world of war and violence; and even to give rise to a new kind of human being" (Corn, 1983).

For the past two decades this recurring dream has focused on computers and telecommunications. Again and again we hear of redemption supposed to arrive through the Computer Revolution, Information Society, Network Nation, Interactive Media, Virtual Reality, the Digital Society—the label changes just often enough for prophets to discover yet another world-transforming epoch in the works. Recently, there has been an interesting turn in this way of thinking. Familiar utopian dreams have been codified as a political ideology of sorts and given a central role in many political discussions about both American politics and world politics. What results is a pungent ideology, one that might be called cyberlibertarianism, linking ecstatic enthusiasm for electronically mediated ways of living with radical, right-wing ideas about the proper definition of freedom, social life, economics, and democracy.
This perspective can be found in a great many places. It is the coin of the realm in *Wired* magazine and other publications that key their fingers on the pulse of developments in computing and telecommunications. It can be found in countless books on cyberspace, the Internet, and interactive media, most notably George Gilder's *Microcosm* (1989) and Nicholas Negroponte's *Being Digital* (1995). Other notable writers in this strand include Alvin Toffler, Esther Dyson, Stewart Brand, John Perry Barlow, Kevin Kelly, and a host of others that some have called the digiterati. As a political program, the cyberlibertarian vision is perhaps most clearly enunciated in a publication first released by the Progress and Freedom Foundation in the summer of 1994, a manifesto entitled "Cyberspace and the American Dream: A Magna Carta for the Knowledge Age" by Esther Dyson, George Gilder, George Keyworth, and Alvin Toffler. From such writings and endless on-line musings in Internet chat groups, there emerges a set of shared themes and a vision of what the new world holds in store.

First and foremost, of course, is an optimistic embrace of technological determinism, one specifically focused on the arrival of digital technologies of the late-twentieth century. A standard benchmark here is Alvin Toffler's simplistic, openly deterministic wave theory of history. Having traversed the first wave of agricultural revolution and a second wave of industrial revolution, humankind is now in the midst of third wave upheavals produced by advanced computing telecommunications. It is said to be a period in human history in which electronic information comes to dominate earlier ways of living that were based upon land, physical resources, and heavy machinery. "As it emerges, it shapes new codes of behavior that move each organism and institution—family, neighborhood, church group, company, government, nation—inexorably beyond standardization and centralization" (Dyson et al., 1994).

What conditions spawned by the new era make possible is radical individualism. Writings of cyberlibertarians revel in prospects for ecstatic self-fulfillment in cyberspace and emphasize the need
for individuals to disburden themselves of encumbrances that might hinder the pursuit of rational self-interest. The experiential realm of digital devices and networked computing offers endless opportunities for achieving wealth, power, and sensual pleasure. Because inherited structures of social, political, and economic organization pose barriers to the exercise of personal power and self-realization, they simply must be removed.

Seeking intellectual grounding for this position, writers of the "Magna Carta" turn to the prophetess of unblushing egoism, Ayn Rand. Rand's defense of individual rights without responsibilities and her attack upon altruism, social welfare, and government intervention are upheld as dazzling insights by the team from the Progress and Freedom Foundation. Indeed, her portraits of heroic individuals struggling their vision and creativity against the opposition of small-minded bureaucrats and ignorant masses both foreshadow and inform the cyberlibertarian vision. Less apparent to Rand's new followers is the bleak misanthropy her writings express.

In a similar vein, the new ideology incorporates the supply-side, free-market school of economic thought reformulated by Milton Friedman and the Chicago school of economics. George Gilder, one of the authors of the new "Magna Carta," provides a crucial bridge here. His best seller, *Wealth and Poverty* (1981), helped popularize and politicize the ideas of the Chicago school during the early days of Ronald Reagan's presidency. His later book, *Microcosm* (1989), develops the social gospel of electronics, focusing upon Moore's Law as the principle that will underlie all future social change. In Gilder's view, the wedding of free market economics with the overthrow of matter by digital technology is a development that will liberate humankind because it generates unprecedented levels of wealth, a boon available to anyone with sufficient entrepreneurial initiative.

But cyberlibertarians do not argue that the wedding of digital technology and the free market will produce nothing more than a world of brass knuckled, winner-take-all competition. Instead
they anticipate the rise of social and political conditions that would realize the most extravagant ideals of classical communitarian anarchism. As Nicholas Negroponte writes in *Wired*, “I do believe that being digital is positive. It can flatten organizations, globalize society, decentralize control, and help harmonize people” (Negroponte, 1995, p. 182). Just ahead is a time in which the new technology will bring sweeping structural change, fostering decentralization, diversity, and harmony. “It is clear,” the “Magna Carta” exclaims, “that cyberspace will play an important role knitting together the diverse communities of tomorrow, facilitating the creation of ‘electronic neighborhoods’ bound together not by geography but by shared interests” (Dyson et al., 1994).

By the same token, democracy will also flourish as people use computer communication to debate issues, publicize positions, organize movements, participate in elections, and perhaps eventually vote on line. The prospect of many-to-many, interactive communication on computer networks will nurture a renewed Jeffersonian vision of citizenship and political society. When television is thoroughly linked to computing power, the universal access to cable television will finally eliminate “the gap between the knowledge-rich and knowledge-poor.” In this new sociotechnical setting, the authority of centralized government and entrenched bureaucracies will simply melt away. Cyberspace democracy will “empower those closest to the decision” (Dyson et al., 1994).

Woven together from available themes and arguments from earlier varieties of social thought, the cyberlibertarian position offers a vision that many middle- and upper-class professionals find coherent and appealing. At present it seems especially attractive to white, male professionals with enough disposable income to afford a computer at home in addition to the one they use at work. It underscores many of the desires and intentions of those who see themselves on the cutting edge of technologically driven, world-historical change. What we see here are ultimately power fantasies, the power fantasies of late-twentieth-century American
males, to be exact, that envision radical self-transformation and the reinvention of society in directions its devotees believe to be at once favorable and necessary.

While episodes of technological utopianism of the past have usually attracted a scant few enthusiasts, cyberlibertarianism has quickly achieved a much more prominent role. Most notable of its adherents is Newt Gingrich, leader of the "Republican revolution" and Speaker of the U.S. House of Representatives. The "Magna Carta" was the project of the Progress and Freedom Foundation, which was created by Gingrich and his followers to advance Gingrich's political program. Ideas strongly resonant with the "Magna Carta," especially those favorable to private enterprise and hostile to the regulatory role of government in the economy, occupied a prominent place in the "Contract With America," to which Republican congressional candidates pledged their fidelity during the 1994 campaign. Indeed, one of the first comments by Speaker Gingrich in the blush of enthusiasm after the successful election was a suggestion that homeless people might escape their misery if only they were given vouchers to help them buy laptop computers. In a speech to The Heritage Foundation in late 1996, the Speaker wondered, "Why can't we have expert systems and advanced computers replace 80 percent of the legal system?" and called for massive infusions of information technologies to handle much of what is now done in schools and the various fields of health care (quoted in Koprowski, 1996, p. 12).

Sometimes labeled a classic conservative, Gingrich's true position more closely resembles a radical cyberlibertarianism in which being digital and being free are one and the same. In that light, his proposals for reform in public policy strongly resemble the methods of reengineering in the corporate world, seeking to demolish structures and practices inherited from earlier times, in the hope that better ways of doing things will quickly emerge from the chaos.
Expecting unprecedented social benefits from the transformations they describe, today's technological utopians ignore some important questions. Who stands to gain and who to lose in the new order of things? How will power be distributed in a thoroughly digitized society? Will the institutions and practices of cyberspace eliminate existing patterns of social injustice or amplify them? Will the promised democratization benefit the whole populace or just those who own the latest electronic equipment? And who will decide these issues? About such topics, the cyberlibertarians, prophets of reengineering, and other technological optimists in our time show little if any interest. Indeed, as we have seen, some of them suspect that to ask or answer these questions could only be a hindrance to achieving the exciting next stages of "biotechnical” evolution in which human and technical life forms will merge.

Within the sketches of a world transformed by digital technology and global webs of production, however, are some distinctly dystopian possibilities. Some of these are evident in the troubling connections between work and everyday life mentioned earlier. Other ominous signs are evident within the very outlines of ostensibly hopeful visions that depict our digital future.

Celebrated in manifestos of cyberspace, for example, is the promise of a through-going dispersal of power as institutions are “demassified” in both a physical and organizational sense. But as one judges this promise, one must remember to read the fine print. Much of cyberlibertarian writing reveals a tendency to conflate the activities of freedom-seeking individuals with the operations of enormous, profit-seeking business firms. In the “Magna Carta,” for example, concepts of rights, freedoms, access, and ownership are first justified as appropriate to individuals, but then marshaled to support the machinations of enormous transnational corporations. Crucial to its position is a concern for how to define property rights that pertain to cyberspace, a task identified as “the single most urgent and important task for gov-
ernment information policy." Here, the writers argue, "the key principle of ownership by the people" is the one that should "govern every deliberation." We must recognize that "Government does not own cyberspace, the people do" (Dyson et al., 1994).

One might read this as a suggestion that cyberspace is a new commons in which people have shared rights and responsibilities. But that is definitely not what the writers have in mind. For clarification they point out that "ownership by the people" simply means "private ownership." And as the discussion continues, it becomes apparent that the private entities that interest them are actually large businesses.

Thus, after praising the market competition as the pathway to a better society, the authors of the "Magna Carta" announce that some forms of competition are distinctly unwelcome. In fact, the writers fear that the government will regulate cyberspace in a way that might actually require cable companies and phone companies to compete. Needed instead, they argue, is the reduction of barriers to collaboration of already large firms, a step that will encourage the creation of a huge, commercial, interactive, multimedia network as the formerly separate kinds of communication merge. They argue that "obstructing such collaboration—in the cause of forcing a competition between the cable and phone industries—is socially elitist" (Dyson et al., 1994).

In the end, the writers of the "Magna Carta" suggest greater concentrations of power over the conduits of information because they are confident this will create an abundance of cheap, socially available bandwidth, pouring the digital solvent over what they see as hopelessly rigid, obsolete, institutional patterns. Today developments of this kind are visible in the corporate mergers that have produced a tremendous concentration of control over not only the conduits of cyberspace but the content it carries. The deregulation required by the Communications Reform Act of 1996 enables such mergers, but strong movement in that direction had begun long before the law took effect. In recent years we have seen elaborate weddings between CBS and
Westinghouse, ABC and Disney, NBC and General Electric, Turner Broadcasting and Time-Warner, and others. To an increasing extent, control of news, entertainment, and publishing is concentrated in the hands of a few large concerns. What, I wonder, ever happened to the predicted collapse of large, bureaucratic structures in the era of electronic media?

Why this is problematic is suggested by the fact that during deliberations in 1995 over the telecommunications reform, CNN refused to carry advertisements critical of legislation that would allow concentration of ownership and control. In a separate incident the following year, the Time-Warner corporation postponed production of a television screenplay entitled “Strange Justice,” based on the U.S. Senate hearings into Supreme Court nomination of Clarence Thomas, including charges of sexual harassment lodged by Anita Hill. At the time the firm had litigation before the Court challenging the “must carry” rule that requires cable television operators to carry local TV stations. Evidently, Time-Warner executive Ted Turner ordered the “Strange Justice” project shelved for fear of offending Justice Thomas and perhaps jeopardizing millions of dollars in Time-Warner profits (Schorr, 1996, p. 19).

The larger issue concerns the problems for democratic society created when a handful of organizations control all the major channels for news, entertainment, opinion, artistic expression, and the shaping of public taste. In the dewy-eyed vision cyberlibertarian thought, such issues are bracketed and placed out of sight. As long as we are getting rapid economic growth and increased access to broad bandwidth, all is well. To raise questions about emerging concentrations of wealth and power around the new technologies would only detract from the mood of celebration.

Other points at which technological utopians distort the character of sociotechnical change come in their projections about the new communities that will form in cyberspace. The “Magna Carta” looks forward to “the creation of electronic neighbor-
hoods' bound together not by geography but by shared interests." Held out to readers is the promise of a rich diversity in social life. But what will be the exact content of this diversity? The answer soon emerges.

An important feature of life in cyberspace is that it will "allow people to live further away from crowded or dangerous urban areas, and expand family time." Exploring this idea, the "Magna Carta" quotes cyberspace guru Phil Salin who argues that "Contrary to naive views, ... cyberspaces [of the coming century] will not all be the same, and they will not all be open to the general public. ... Just as access to homes, offices, churches and department stores is controlled by their owners or managers, most virtual locations will exist as distinct places of private property." A wonderful aspect of this arrangement, in Salin's account, is that inexpensive innovation in software can create barriers so that "what happens in one cyberspace can be kept from affecting other cyberspaces" (Dyson et al., 1994).

As the picture clarifies, what appears is diversity achieved through segregation. Away from the racial and class conflicts that afflict the cities, sheltered in a comfortable cybernich of one's social peers, the Third Wave society offers electronic equivalents of the gated communities and architectural barriers that offer the well-to-do freedom from troubles associated with urban underclass. Indeed, many proponents of the on-line world openly celebrate the abandonment of older cities in favor of the "wired" exurban enclaves. For George Gilder the new promised land is to be found in such homogeneous and untroubled locations as Provo, Utah.

While tendencies of social separation are by no means new (suburbanization has been with us for many decades), it is worth noting the kinds of boundaries of occupation, residence, and social class that define the composition of cyberspace as it currently exists. By comparison, the nexus of old-fashioned industrialism—the urban center—was far more diverse and socially interactive than the on-line cultures emerging today. In the cities
it was all but inevitable that people of diverse vocations and ethnic backgrounds would have to rub shoulders with each other every day. While the very wealthy were able to shelter themselves in mansions in remote locations, the rest of the populace was forced to contend with social differences on a daily basis. A mirror of these encounters was present in the general interest newspapers that served as a primary means of communication. While people at different levels of society read papers with drastically different slants—from sensationalistic tabloids to serious, high-quality journalism—the report was always about the same social universe: the metropolis situated in the wider world. How different this is from the smug, self-contained yuppy cyberzines—*Hot Wired, Slate, Salon,* and others that fill pages on the World Wide Web.

There are, in my view, signs that on-line benefits of access to information and on-line community are being purchased with a decline in habits of sociability. Because we are citizens of cyberspace, even our next door neighbors do not matter all that much. We can stay in our rooms, stare at flat screens, surf the Internet, and be satisfied with simulacra of human contact. Recent reports indicate that this mentality has already affected social life on college campuses. Rather than congregate in coffee houses or other gathering places, many students stay in their rooms or in computer labs communicating through the network, even if the other persons in the conversation are no more than an arms length away (Gabriel, 1996). At the college where I teach, it is not uncommon to find young women and men who are far more comfortable with the disembodied relationships in the global cybersphere than they are with persons who are physically present. Thus, all-too-often becoming “wired” involves increasing isolation, discomfort, and even fear of the presence of other people.

My fear is not that people will forget what love is about or reject the pleasures of human company. I have more faith in biology than that. What worries me is that people will begin to employ networked computing as they already use television, as a way to
“stay in touch” while avoiding direct contacts in the public world. The basic question concerns how we will regard ourselves and others in a wide range of technically mediated settings. Will people beyond our immediate family, professional colleagues, and circle of on-line friends be seen as connected to us in important, potentially fulfilling ways? Or will they be seen as mere annoyances, an unwanted human surplus that needs to be walled off, controlled, and ignored?

These questions are especially important when it comes to those in the United States who are already seen as candidates for the discard pile—the poor, disabled, and working-class elderly, among others. For a significant percentage of young black males, for example, the digital electronics most likely to affect their lives are the sophisticated surveillance mechanisms built into today’s “control unit” megaprisons, the infrastructure of an American gulag. What does the emerging utopia of cyberspace and global production hold for them?

On occasion, even the most avid proponents of rapid technological and organizational restructuring pause to reflect on those left high and dry by these transformations. At the conclusion of his book *Beyond Reengineering*, Michael Hammer worries whether the program he proposes will bring “utopia” or “apocalypse.” “What will become of the people who merely want to come to work, turn off their brains, and do what they’re told until quitting time? Of those who simply don’t have the drive, ambition, and intensity to focus on processes and customers? . . . What of those who can’t handle constant change, who need stability and predictability? Must they all be left behind, orphans of the new age?” Hammer ponders the prospects for education and retraining to raise obsolete workers to the levels of ability and initiative that will be required of them. But he laments that such improvement seems doubtful even over the long term. “The problem of what to do with ‘little people’ will be with us for some time” (Hammer, 1996, pp. 259–60). It is a major problem indeed.
Direct Engagement with Technical Things

Episodes of social upheaval linked to technological change have been with us for a long while. During the past two centuries there have been a number of ways people have responded to vexing disruptions in their ways of living—labor union organizing, Luddism, populism, socialist politics, issue-centered movements for social reform, environmental protest, and Green politics among others. While these approaches still have much to offer, none of them seems fully prepared to confront the challenges presented by the powerful, polymorphic, destabilizing forces contained in technological innovation today. Protest of past decades were often able to focus on relatively fixed targets—obnoxious railroads, industrial assembly lines, controversial water systems, toxic waste dumps, and the like. Many intellectual critiques of technology, similarly, lamented the ponderous rigidity of technology-centered institutions—Max Weber’s Iron Cage of bureaucratic rationality or Lewis Mumford’s lead-footed Megamachine, for example. But today intellectual and political strategies must recognize the sheer transience of instrumental and organizational forms as well as the plans that guide them. In this respect Marx was entirely prescient: “All that is solid melts into air.”

The condition we face has strong implications for thought and action. Those who care about human well-being and the values of civic culture must be prepared to confront emerging technologies directly, early on in their development. To an increasing extent the crucial questions about the complexion of work, education, leisure, and community life must be engaged far “upstream” in processes of sociotechnical planning, design, and development. No longer will it suffice to seem ignorant or surprised as the new technical devices are woven into the social settings one cares about—computers in schools, agile technologies in the workplace, Web browsers in the living room, or surveillance cameras in the mall. Instead one must focus upon important areas of shared purpose where new devices might intervene and become involved in processes of change.
To my way of thinking a perfectly valid way to become involved is simply to say "no." For there is nothing more positive than to resist technically embodied schemes predicated solely on efficiency, productivity, profit, or the dubious promise of some desirable effect (for example, better schools) while ignoring the deeper virtues already present in structures and practices scheduled for hasty renovation or elimination. Positive strategies of this kind are present, for example, in the many cases of local resistance to the coming of Wal-Mart megastores. This may not seem like a case of intervention in the preparation of a technological system, but actually it is. Among the devices most influential in our economy are sophisticated electronic data systems that enable instantaneous inventory control. Wal-Mart and similar chain stores are based upon a seemingly innocuous digital spinal cord that enables the chain to have precise knowledge over the flow of goods that enter and leave its outlets. This has the consequence of reducing the funds invested in inventory at any given time. When combined with the advantages that accrue to large, multi-unit retailing, such systems enable the Wal-Marts of the world to undercut small, local retailers. Of course, people look at the falling prices. Joe's Downtown Pharmacy sells the toothpaste for $3.00 and Wal-Mart for $2.30. What's to choose? Let's buy the lower cost item, provided by the more efficient seller.

But as increasing numbers of people across America have begun to notice, the cost of the tube of toothpaste is not really $2.30. The costs must also be measured in broader social consequences. Small local retailers provide a key link in networks of social support and webs of civic vitality. When the large chains move in and the small businesses die, not only are many jobs lost, but also communities that housed them begin to wither. When compounded by other forces that tend to weaken crucial supports for community life, the effects of electronic data systems contribute to the growing sense that the places where we live are no longer friendly, safe, or humanly sustaining. That is why saying "no" to otherwise appealing "developments" like the building of
chain stores and the spread of shopping on the Internet makes perfect sense in some cases (see Winner, 1997). Being involved with upstream choices, however, often means becoming knowledgeable about the design of new systems in the hope of shaping their features. After decades in which labor unions ceded control of almost all technology planning to corporate managers, some unions have decided to cultivate new expertise about which production systems are in the works and to play a role in their design. Exploring ways to influence the hardware, software, and social arrangements of new workplace technologies comes under the general theme of “high performance systems.” As a report by the Work and Technology Institute in Washington, D.C. comments, “The core element of high performance is to give front-line workers the responsibility, autonomy, and discretion for key decisions at all points of production and to provide employees with the information, skills, and incentives needed to successfully exercise those judgments” (Jarboe and Yudken, 1996, p. 2). Whether or not these efforts flourish in the troubled waters of American labor relations remains to be seen. But the decision to engage the shape of production technologies directly, rather than let them flow as if from a volcano, is an important turn in labor’s understanding of its horizons.

There are other cases that might be cited as lively examples of upstream engagement with technological change—the creation of civic networks in computing, the development on implements tailored to the needs of the disabled, the rise of community supported biodynamic farming, and the firestorm of protests that have greeted attempts to assemble and market databases with stored information on millions of consumers. While these are only small bubbles within much larger tides, they do reflect some willingness to address issues about the common good at junctures where new devices, techniques, and systems are in the making.

Of course, a renewed awareness and willingness to act will not be enough. Occasions for participation in technology-shaping must be discovered, created, or forcefully demanded. In most
cases, the origins and character of impending technological change are opaque to workers, consumers, and ordinary citizens because they have never been included in research projects, engineering designs, or business plans, including ones destined to alter their lives profoundly. This is certainly true of those who click their keyboards day after day at the Remote Encoding Center in Latham. No one asked for their ideas on what the facility and its equipment might look like or how it would (or should) affect them. Their experience, like our own, is not that of having rich opportunities for study, experiment, and choice in the "social construction" of technology. Instead it is the experience of imposed solutions, of being receptacles for patterns and processes whose character has been decided elsewhere.

Notes

1 See, for example, Wiebe Bijker et al., 1987. For my critique of this way of thinking, see "Social Constructivism: Opening the Black Box and Finding It Empty" (1993).

2 Esther Dyson, George Gilder, George Keyworth, Alvin Toffler, "Cyberspace and the American Dream: A Magna Carta for the Knowledge Age," Release 1.2, Progress and Freedom Foundation, Washington, D.C., August 22, 1994, at http://www.townhall.com/pff/position.html. This document was published to the World Wide Web where there is no standard style for pagination. All references that follow will simply indicate that a quote is somewhere in this "Magna Carta."

References


