The Changing Nature of Information Societies

Ezra Vogel
(Harvard Univ.)

No one any longer doubts that information technologies now being developed will radically transform the world we live in and that the work conducted by those assembled here and their colleagues around the world will play a major role in this transformation. The new developments in computers, telecommunications, software, data bases, networking, in fiber optics, and artificial intelligence are opening a new world we are only beginning to comprehend.

The importance of these developments and the uncertainties that surround them give rise to grand visions and terrifying nightmares. Entrepreneurs foresee great new fortunes, engineers and scientists imagine glorious new technology, and idealists conceive new versions of utopia with previously inconceivable sources of information and conveniences. Others of less optimistic bent are haunted by new nightmares, of finding their skills no longer marketable and of creating a new society with widespread unemployment, new invasions of privacy, new depths of totalitarian control, new thefts and destruction of information, new losses in social order.

My task today is to reflect on the nature of this social transformation and the means by which responsible leaders in various countries and in various walks of life might so guide the transformation as to enhance the benefit of mankind. I speak as a sociologist concerned about the broad social ramifactions and as an American specialist on Japan and other East Asian countries.

It is hardly an easy task. We already have an almost infinite variety of estimates of what the information revoluton might bring, and the nature of new technologies, let alone their ramifications for society, are impossible to predict. Those in related businesses may be more in touch with changes than outsiders, but even they are often badly mistaken.

In 1875, for example, Alexander Graham Bell took his newly discovered telephone, to a company, proposing to sell them the patent. The company considered the report. I quote from part of their conclusion:

"Bell's proposal to place his instrument in almost every home and businessplace ...is fantastic... The central exchange alone would represent a huge outlay in real estate

and buildings, to say nothing of the electrical equipment... Bell expects that the public will use his instrument without the aid of trained operators. Any telegraph engineer will at once see the fallacy of this plan. The public simply cannot be trusted to handle technical communication equipment... Bell's instrument uses nothing but the voice, which cannot be captured in concrete form... We leave it to you to judge whether any sensible man would transact his affairs by such a means of communication. Bell expects that the subscribers to this service will pay to have the instrument installed. We feel that it is unlikely that any substantial number of people will agree to such an arrangement. In conclusion, the committee feels that it must advise against any investment whatever in Bell's scheme... Any development of the kind and scale which Bell so foudly imagines is utterly out of the question.''

The company which issued this report was Western Union, and the price Bell had asked them to pay for all rights for the telephone was $100,000. Such was the capacity of business leaders to foresee future developments. Yet fortunes have also been lost by those who bet on new technologies that turn out not to be commercially viable or are soon superceded by other technologies. It is perhaps even more difficult to predict the social consequences of technologies as yet unknown.

Yet societies need to provide some direction for these developments which are occurring much more rapidly than in the first industrial revolution. If one had to make an overall judgment on the ability of nations to manage the industrial revolution in Europe and North America it is difficult to avoid the conclusion that it was badly managed. Wondrous new technologies made possible the production of inexpensive and durable cloth on a mass scale. They made possible mass production of iron and steel, to the immeasurable benefit of mankind. But these developments were also accompanied by excessively long hours, by the exploitation of men, women, and children in inhumane physical environments.

We now have much better understanding of social forces than we had in the 19th century and nations are better prepared to examine and respond to the social changes now taking place. Yet as beneficial as these new developments may be for mankind, they have great potential for wreaking unintended havoc on certain communities and enterprises. The question is whether we can develop a timely and sufficient understanding of these changes to provide social and political guidance to the information revolution, now in its early stages, so that it will be of benefit to mankind.

To prepare for my talk today I have read broadly in the works of those seriously thinking about the shape of the future. As a brief composite estimate of major social changes that are most likely to occur, we might list the following:

The Transformation of Society by Information Technology

1. The increasing role of information and knowledge as the driving force in society. Here the insights of Daniel Bell, over a decade ago, in describing the post-industrial society appear increasingly apt. The proportion of our population engaged in primary economic activities like agriculture and secondary activities, notably manufacturing, has continued to decline.

In most developed countries, fewer than 10 percent of the population are engaged in agriculture, and fewer than 30 percent are engaged in manufacturing. Not only is the proportion of people engaged in information growing, but the informaiton industries are driving new technology and economic expansion. Knowledge, science, and technology are increasingly replace capital as the determinants of political, social, and even economic power.

2. The shrinking of social space. The increased speed and the reduced costs of communication diminish the social isolation of people throughout the world, putting them in closer touch with worldwide developments.

Some estimate that about one quarter of the world's population was able to watch the Olympics this past summer. the expansion of the written message but especially the transmission of visual images is having a powerful impact on the minds and behavior of people everywhere.

Several years ago, a newspaper called the World Paper was founded, written by people from the country where the news was occurring, with the same news distributed to all peoples throughout the world. Though we have few world papers, television networks, journals, and news services are increasingly becoming worldwide in their gathering and distribution of their information. Financial markets in one country are increasingly linked with those in other countries, and we may soon see the development of 24 hour markets, acknowledging at a minimum the close links between markets around the world, and possibly the creation of a genuinely world market.

As barriers come down, we have even greater need for a universal language.

Certain specialized limited languages have already become virtually universal among certain groups of specialists. Just as Mandarin Chinese, originally the language of on local area in China, became first the language of elite throughout China and now is becoming the language of all China, so English, originally the language of certain localities, is rapidly becoming the language of elite throughout the world and is beginning to spread well beyond the confines of the elites in many other countries of the world. English may not be the most appropriate or serviceable world language, but the need for standard communication is becoming so great that as the most widely used language, its usage will undoubtedly increase.

3. The expansion and diversification of sources of information. Although certain media outlets, certain national magazines and newspapers, television channels, and wire services now command a general audience of very substantial size, the trend is clearly for diversification of sources of information. In the latter part of the 19th century many communities of the world had a 4 page newspaper, read almost universally in those communities. They have increasingly been replaced by greatly enlarged newspaprs with sub-parts aimed at specialized audiences that read their favorite part. Just as the telephone made possible the explosion of individual communication over distance, so cable TV, the personal computer, and other technology add to the diversity of sources of information that is already exploding through increasingly specialized journals, newsletters, .and data bases.

The expansion of these specialized sources of information reduce the centralization of power in the hands of a small

group of networks, newspapers, and magazines. The awesome power of a handful of television networks to shape the images of a nation and of the world will be increasingly moderated by the wide proliferation of specialized sources of information.

This increased diversification will give increased power to the user. He will have increased options of selecting between rapidly exploding alternatives for substance as well as format giving him increased choice.

4. Centralization and decentralization. New information technology simultaneously makes possible new kinds of centralization and new kinds of decentralization. In most democratic societies the effects of decentralization may be stronger for the availability of information reduces the necessity of people being located in large offices in the center of large metropolises. Large organizations can increasingly decentralize their operations, sometimes giving firmer direction over local activities through increased communication, sometimes providing their branches increased leverage to adapt in their own way by virtue of access to increasing amounts of information from the home office.

Individuals, less bounded by the necessity of being in the same location to exchange high levels of information, will have increasing freedom in determining their own physical surroundings. This freedom has given rise to the notion that many people may choose to live in their own so-called "electronic cottage," their own home in rustic surroundings yet perfectly in touch with information relevant for perfoming important work as part of large organizations.

This gives us unprecedented opportunities to fashion our own social order and forces us to consider basic new questions like the kind of social setting that most of us consider desirable. Do we prefer to work and live at home in an isolated setting, or do we prefer to work in large metropolitan centers, or do we prefer to work and live in smaller communities with smaller groups of people?

5. Expansion and systematization of knowledge. The intense speed and power of computers has now given us the capacity to sort through raw data and perform analyses that were never before possible. New data bases and the capacity to systematize knowledge and use machines for making inferences are exploding on scales never before imagined.

Those of you working on expert systems are engaged in helping a wide variety of specialists verbalize and think through the implicit logic of their work. This makes their specialized skills more accessible for those learning to become specialists and it also makes some skills that have been considered "intuitive" or "requiring expert judgment" more accessible to systematic evaluation and improvement.

It is no secret that many who are uncertain about the viability of their intuition and clinical judgment in standing the test of careful examination find it easy to join the chorus of those who fear that new computer research will lead to mechanistic solutions that destroy the deeper and finer meaning of life. They are merely the professional tip of the iceberg of the large army of workers and service personnel threatened by the new information age just as craft workers and local industries were threatened by the new modern mass production in the course of the industrial revolution.

It is not difficult to imagine resistance to the new expansion and systematization of knowledge. Continued resistance will not stop the expansion and systematization of knowledge, but it can create a certain amount of unnecessary chaos.

6. Control over porduction and distribution. Although "information technology" may not be the best term to describe it, a new revolution is also occurring in the production process. The ability to guide machinery with numerical controls and with computers is rapidly increasing our capacity to control production and the flexibility in the numbers and types of goods produced while decreasing the number of workers required for manufacturing.

Not only will this process vastly reduce the number of workers, but the nature of the manufacturing process will also be radically changed. The nature of the assembly line, the range of goods produced, the structure of the factory itself will all be radically altered by the ability to run machines 24 hours a day every day with computer controls and, in some cases, with virtually no workers.

New electronic controls are also revolutionizing materials handling. Much better data on the availability of materials and supplies and the ability for instantaneous electronic order of goods are greatly reducing the need for warehousing and storing materials. This has the potential of bringing great changes in the nature of wholesaling and retailing as well in warehousing and in the relations between manufacturers and suppliers. In some cases it has the potential of allowing direct contacts between consumers and suppliers, eliminating in some cases, the need for retail outlets and branch banks.

Issues in the Social Management of the Information Revolution

One could go on with this list of fundamental changes being wrought by the information revolution, but these are certainly some of the most fundamental ones. such changes raise complex issues in social management but provide new opportunities in increasing the range of choices open to us in guiding society. Among the fundamental issues confronting us are the following:

1. How do we increase equality of access to information?

Daniel Bell has argued that just as capital became the key resource for industrial society so is knowledge or information the key resource for the new era. Just as inequality in wealth was a key problem in the industrial era so is inequality in information a key problem in the post-industrial era.

In the United States, for example, it is easy to imagine that suburban schools will provide the facilities and the instruction so that most youth will have the opportunity to learn how to use computers and to gain access to many kinds of data bases. Will the same be true for our inner-city schools? It seems unlikely without some special efforts on the part of political leaders.

Just as Michael Young was able to imagine a revolt against the meritocracy by those who were excluded from the more attractive positions, so it is possible to imagine serious alienation amongst those in the society who do not have the know-how and the funds to gain access to new sources of information. It is possible to imagine new versions of Sesame Street us-

ing electronic games as a way of gradually upgrading the computer and communication skills of those who might otherwise be disadvantaged in the information society.

Television is readily available in societies where citizens can afford to buy a television set, but as new data bases provide specialized information, new questions arise. Who will be able to afford to use the data bases? Are we creating kinds of information that will increasingly be available only to small numbers of people who can pay, thus creating further cleavages between them and those who can and cannot pay.

Comparable problems over access to information may create further cleavages between the have nations and the have not nations. To be sure, satellites have brought the most modern TV programs to the most remote villages of the world, but many societies can still not afford the widespread distribution of telephone and radio, let alone television and computers.

The introduction of new international media to lesser developed countries has revolutionary potential. In a certain sense, the peoples of many lessr developed countries endure their lower economic levels because they are not constantly aware of the backwardness of their own way of life compared to more developed countries. The opening up of communication in remote backward areas has explosive potential in reducing the willingness to endure lower standards of living. What is the desirable policy about the pace of introducing vivid impressions of higher standards of living to societies where such levels of living are unattainable in the short run? What will such rapid opening of telecommunications do to political and social order in those societies?

The problems may be especially great in those societies with less democratic governments where ruling groups have endeavored to maintain tight control over the information going to their peoples. New technologies that span national boundaries may tight control over access to information increasingly difficult to sustain. Many of us would applaud the increasing access to information, but what new disorders might be set loose and how is the world to control this disorder?

Most lesser developed countries first set goals where they produce their own television programs and yet end by using few of their own programs but relying instead on those from other countries because of the expense and the special skills required to produce high quality programs of great interest to their publics. How do they develop the skills to provide information of benefit to their own peoples? Indeed, how do peoples everywhere preserve their cultural traditions through the new media as increasingly homogenized programming which knows no territorial boundaries becomes available throughout the world?

2. How do we match job openings and available workers? The changes in the international division of labor as a result of the vast increase in world trade have heightened the speed of change in the economic structure of many countries. But the radical changes now occurring, first in the modernization of agricultural and industry in many lesser developed countries and in the electronic control of manufacturing and service activities in developed countries are changing the structure of employment with unprecedented speed. How do we better assess and understand the nature of these changes? Then how do we develop a system for helping displaced

workers acquire the skills appropriate to their opportunities in the new society.?

In the earlier industrialized countries, the loss of jobs in manufacturing are not only of unprecedented scale, but the skills required in previous jobs are often not useful for the new types of jobs being created. It is sometimes difficult even to find new opportunities that would be appropriate, even with new training. Americans who dream of solving their employment problem in the "rust belt" by reindustrialization, for example, are out of touch with changing realities. In fact, competitive heavy industries around the world are introducing new technologies that require very few workers, and as long as we have an even moderately free world trading system there is no way that heavy industry anywhere can again absorb massive numbers of workers.

The question for societies is thus how to provide affected workers and affected regions with the assistance in making a smooth transition. How, first can many be given the job security so that they will be willing to accept the changes in their work place that will enable their firms to remain viable in a world economy? Indeed, it is a sign of the failure of societies to provide such security and to manage such changes that has led workers in many of the most developed countries, especially in Europe and North America, to use labor union movements and political pressures to retain the old patterns of organization until they have long since lost their international competitiveness.

Thus far in the most dynamic nations that have pushed the information society, new jobs in high technology and in the service sector have basically expanded rapidly enough to replace most of the jobs lost through decaying industry. Whether this can continue is not clear. Much of the expansion in employment has been in jobs in government, but it is becoming clear that the tax burdens in these countries is becoming large enough to strain the private sector's capacity to remain internationally competitive. At the very least it is unlikely that these countries can sustain the continued expansion of governmental positions at the same rate as in recent years.

Thus far, new expansion in high technology has created new jobs and created new demand. It is not clear whether this will continue indefinitely. There are already signs in some of the most modernized companies around the world that with new information technology they can improve and increase their output and perform their essential services with smaller numbers of employees. What will happen if this continues?

Western Europe and North America already have unemployment rates bordering on 10 percent or higher and it is quite conceivable that these rates will continue to rise as electronic controls are intorduced in manufacturing and the service sectors. The problem in these societies is not that there is insufficient wealth to provide acceptable standards of living for most of the people. The problem is that is is difficult for these societies to maintain social order. How do these societies provide on the one hand sufficient motivation and sufficient incentives for efficiency that their firms remain internationally competitive and on the other hand distribute wealth so that all in the society can enjoy the minimal material benefits? It is increasingly clear that social welfare provisions for 10 percent or more of working age population brings great social unrest,

threatens the motivation of the employed population to work hard, and heightens the cleavages between the working and non-working. One possibility is to reduce still further the average work week, but how is society to prevent the more ambitious in the society from taking two or more jobs, thus again raising the unemployment levels? How do we indeed find ways of assessing these employment changes, providing opportunities for retraining, and for motivating displaced workers to find these new jobs?

3. How do we ensure rapid expansion of facilities in public areas?

One can expect that successful enterprises will move quickly to modernize facilities and that some parts of public sectors (such as defense, finance, etc.) will move quickly to provide modern information services. In some parts of government, especially local government, in educational institutions, in public health facilities, in public utilities and other public corporations, it will require special efforts to provide the funding and know-how to keep pace with modern developments. How do we ensure that these sectors will keep pace with public need?

4. How does government manage increasing complexity and change?

Since the 1950's as society has grown more complex, regulations have multiplied in number making it increasingly difficult to achieve timely solution of problems. Despite efforts in the U.S., for example, to decrease the number of regulations, the number of regulations roughly tripled during the 1960's and 1970's and despite efforts toward de-regulation in the early 1980's in areas like transportation and communications, the overall quantity of regulations has remained very high. Despite

the ready availability of information, or perhaps because of the excessive amount of information to be digested and analyzed, many issues cannot be dealt with expeditiously, especially when they involve both public and private sectors.

Regulations requiring legal procedures are especially time-consuming. In American urban projects, for example, it came to be assumed in the early 1970's that difficult complex projects for urban development were impossible because the various parties could not each move in pace to solve the problems before changes occurred in the environment or in the various parties that required additional changes in plans. Coordination between national and state governments and private companies involved was too slow moving to meet the demands of all parties and hence the new conventional wisdom was that projects had to be simplified to succeed. As analyzed by Bernard Frieden, however, projects became in fact more complex yet succeeded, not only because of greater information, but because of new patterns of cooperation between private and public sector representatives in non-legalistic framework provided a basis for cooperative solutions to complex problems.

With rapidly changing technology, complex regulations are a hindrance to timely implementation. At the same time, government activity is necessary to provide assurances for those who develop research and technology and to provide standardization of new products at an appropriate time so that markets can develop smoothly and easily without become excessively rigid and wedded to out-dated technology. Obviously, close cooperation is required between the public and private sector to

permit the timely solution to these problems.

5. How do we get cooperation between governments to deal with these complex issues?

Since nations naturally respond to internal political pressures to look after local interests, the problems of international cooperation to achieve the free flow of information—problems of standardization, assigning radio frequency and satellite orbits, of forging internatioal agreements are all the more difficult and important. The question is less that of devising technical solutions which experts might agree to than of getting cooperation of various governments because of the political forces in various countries.

The Role of Japan in the Information Age

Since this meeting is sponsored by a Japanese organization and is being held in Japan, it is perhaps appropriate for a so-called "foreign specialist" on Japan to make a few comments on the role of Japan in the information age.

Japanese leaders have identified the information age as a very high priority. With the world's second largest market, with a population that enjoys the world's highest average educational standards, producing the free world's largest number of electrical engineers, Japan has every reason to expect to be a major producer and consumer of information services.

Japan has earned the respect and admiration of the world for its ability to mass produce high quality goods and to be able to sell them at competitive prices. The fifth generation project represents an effort by Japanese scientists, engineers, and political leaders to show that Japan cannot only make good use of inventions developed elsewhere but that it can advance to the cutting edge of new technology and contribute to the discovery of new technology, both hardware and software, that will be of benefit to all mankind. Japanese leaders in all circles are busy at work in trying to enhance the creativity of their population so as to develop new technology as well as applying technology basically developed elsewhere. With high education levels in science and math and great receptivity to new technology, the Japanese population is well-suited to the information society.

Japan has great strengths in mobilizing leaders from different circles to consider the national interest and to study carefully developements elsewhere to draw up programs for rapid application to the entire society. The government has been successful in finding ways to nudge the private sector forward and provide a stable environment while the private sector moves quickly to implement. Large private firms, competing intensely wiht each other, have nonetheless achieved a measure of cooperation under the leadership of the government (AIST) and NTT to advance the state of research in highly focused areas likely to be important for future commercial applicaiton.

As a highly homogeneous society, with common language and history, Japan has moved rapidly to acquire familiarity with foreign developments. These same factors which have made it easy to gain cooperation of different groups of Japanese have made it difficult for Japan to be open to outsiders. Nationalism in scientific research is everywhere strong, and because of Japan's homogeneity it is especially strong

in Japan. Japan has notably lagged behind in attracting foreigners to work in laboratories in their country. Many Japanese have take steps to internationalize, and many connected with the 5th generation project, for example, had hoped to include foreigners in this research, as they announced at the first international symposium three years ago. Many foreigners regret that the forces of nationalism in the intermediate three years have made it impossible for these Japanese to achieve their aim and feel great appreciation for those within Japan who are working to open Japanese doors and Japanese laboratories and research results more widely so as to benefit all nations.

Japan also has shown great skill in achieving a consensus about the general direction society should move and in looking out for those adversely affected so that new technology and new organizations can be put in place with great speed. Just as Japan moved to get the high speed shinkansen train widely available throughout Japan, so may we expect that Japan will move quickly to put a new information network system, with fiber optical cables, in place throughout the country. One can expect that as new technology stabilizes and reaches a plateau that Japanese will find mechanisms to see that the technology is spread throughout the society very rapidly and that programs are in place to ensure that the vast majority of the population has the know-how to make use of the new technology.

Not only have the Japanese determined to develop the new tehcnology with great speed, but they have determined to speed its social acceptance in various sectors and to find ways that it can be spread throughout the society. They are prepared to create new organizational patterns to assist this diffusion. They have determined, for example, that the environmental and commuting problems in major metropolitan areas create porblems for the quality of life. They are therefore promoting national programs for the development of "technopolises," middle-sized cities adapted to the new information age. Japan is thus taking the lead in thinking through the kind of urban social arrangements most appropriate for the information age.

Because of the low unemployment rate (currently below 3 percent) and because of permanent employment, Japanese employees are less resistant than employees in most countries in introducing new technology. The widespread awareness of the nature of competitive global markets makes Japanese leaders and workers ever eager to adopt new technology. Since many women in Japanese offices work only several years from the time they complete their formal schooling until they marry or have children, new generations of women well trained in data management will rapidly replace older generations of office workers less well trained in the new technology.

Although nationalism is strong in Japan, the readiness to adapt to world circumstances and the desire to cooperate in world programs for the benefit of all is also strong. Japanese are very proud of the prosperity which they have achieved, but they are increasingly aware what their own prosperity is dependent on a prosperous world. The challenge for all of us is, while working for the prosperity of our own companies and our own countries, to find grounds for cooperation that will benefit us all.