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The Information Society

The mixture of microchip technology and telecommunications is changing our lives in many ways. Is it slipping out of control? No, but we must think about how to apply it. It can hurt us or help us depending on how it is used . . .

☐ One would have to be very much cut off from the world not to have heard that we in the developed countries are caught up in the information revolution. We have been told again and again that, because a new age is bursting upon us, we had better adjust to conditions of living that are radically different from those of the past. The message has more immediacy to those whose work has been changed by the latest wave of technology than to others to whom the world looks much the same as it did 20 years ago. But it seems that, whatever our circumstances, most of us are at least a little puzzled as to what is actually going on.

First of all, are we really in a revolution? The word is defined as a "turning upside down" or a "great reversal of conditions" — is that what is happening, or are we merely experiencing a vast acceleration of the age-old evolutionary process which, by its very speed, gives the impression of a massive structural shift?

There can be no doubt about the speed-up. A paper published by the Science Council of Canada in 1982 says that the pace of technological advance in the past few years has only been matched by its absorption into the marketplace at a rate seven to ten times faster than any previous technology. Nor can we discount the magnitude of the change: The same paper notes that since 1968, the power of computers has increased 10,000 times while the price of each unit of performance has decreased 100,000 times. Stanford University economist Edward Steinmuller says that if the airlines had changed as much as computer-related technology, an airplane would now be carrying half a million passengers at 20 million miles an hour for less than a cent apiece.

Many more spectacular statistics are quoted to show that the recent developments in electronics are of a revolutionary nature. But the story is perhaps more clearly told in terms of real events.

Revolutions overthrow the established order, and no business was more firmly established a few years ago than the Swiss watch-making industry. But the advent of the inexpensive and accurate quartz watch made in Japan caused the loss of tens of thousands of jobs and the bankruptcy of hundreds of watch companies in Switzerland before the industry recovered to find a niche for itself in the prestige market. The upheaval was symbolic of the move out of the age of industry and into the age of electronics. The world's finest mechanical devices were replaced by tiny crystals and batteries with no moving parts.

Many other familiar institutions have been jolted by micro-electronic technology. The American television networks had never known a decline in viewership until video games and recorders successfully challenged their dominance of the home screen. The traditional service station is giving way to self-service outlets offering lower prices because of computerized pumps which record purchases of gasoline at a central cash desk. The neighbourhood hamburger stand has been supplanted by chain operations which use computerized systems to speed through orders and control inventory.

The time-honoured institution of banking hours has been effectively abolished by electronic terminals which offer round-the-clock service. The Post Office has been challenged by the private transfer of letters and documents via word processors — electronic mail. Word processors also threaten to bury the office typewriter, just as the electronic calculator has buried the mechanical adding machine. In a reversal of form, the old institution nostalgically known as the penny arcade has been revived by electronic games.

So we can assume that there has been a revolution of sorts. It has been brought about mainly by the development of microchips. These little bits of silicon can be made to count, to memorize functions, to recognize symbols and to respond to instructions. They have made possible such wonders as the telephone that answers itself and the cash register that "knows" what to charge for a bunch of grapes and can tell by reading those mysterious stripes on the sides of packages whether a can contains tomato or chicken noodle soup.

What do we mean by information? Basically, it is 'something told'

The chips have an incredible ability to store information. They can squeeze the contents of books by at least 10,000 times. Using a combination of microchip and laser technology, all the words in the 435 kilometres of book shelves in the Library of Congress in Washington could be contained on one wall of a large living room. And the capacity of microchips is expanding all the time.

When most people hear the word "information", they are inclined to think of television news and documentary programs. The fact that we are the best-informed — or at least the most massively-informed — society in history is an important feature of the information age. But the prophets of this age have much more than public information in mind when they say that our lives are coming to be ruled by information. It might be basically defined as "something told", and telling things to one another has become one of the leading preoccupations of a modern economy.

To an ever-increasing extent, things are told through a combination of microchip and telecommunications technology which is best described in a word adapted from French: "informatics". At the same time as the capacity of domestic communications systems has been expanded thousands of times by the replacement of copper wires with microwave links and silicon-based fibres, satellites have extended the range of instantaneous communications around the globe.

The ability to move information regardless of distance and time and to store it for future use has transformed many of the standard ways of doing things. For example, investment money in a country no longer need be directed to domestic stock and bond markets. Through informatics, it can seek the best return anywhere in the world, around the clock.

The fact that microchips can store and manipulate information has aided this process. If a broker in Vancouver wants to find the latest price of a stock in Hong Kong, he can call it up at any given time on a video display terminal. The microprocessor in the machine will draw on its memory to calculate the price/earnings ratio and yield as well.

Machines today not only tell things to people, they tell things to each other. Computer-to-computer communication has become common in industrial plants. A few years ago, a tradesman would guide a machine tool by hand through a series of motions dictated by a hand-drawn blueprint. Now, the instructions formerly carried on the blueprint are developed by a computer and fed to another computer which operates the machine. Those instructions are information — "something told".

More people will work with information, fewer with goods

The exchange of information among computers has caused a kind of population explosion. They multiply the amount of information available by mating different sets of facts to breed new facts. Their capacity for comparing and combining disparate pieces of data has opened new horizons for research into any number of subjects. The question at the heart of all scientific inquiry — "what if?" — can be endlessly explored by matching facts and figures with one another until a proposition is proved or otherwise.

Because more and more information is being produced, it is taking up more and more of the energies of the society. A study done by Shirley Serafini and Michel Andrieu for the federal Department of Communications in 1980 found that information workers then comprised at least 40 per cent of the Canadian labour force, compared with 29 per cent in 1951. They included as information workers all those who produce it (such as engineers and surveyors), process it (such as clerks and managers), distribute it (such as teachers and journalists), and run the technical system (such as machine operators and printers). Their criteria hold some surprises for those who think of information in traditional terms: for instance, optometrists are classified as information producers because, when you think of it, the results of eye tests are information. Judges are considered information processors because they must analyse the evidence presented to them by lawyers, who produce information by gathering facts and legal precedents.

According to management sage Peter Drucker, information has become "the central capital, the cost centre, and the central resource of the economy". With the fading of the industrial age, in which most workers were concerned with producing goods, the number of information workers is bound to rise in inverse proportion to the number of workers directly engaged in goods production. There will be relatively fewer machinists in industrial plants and relatively more software specialists working at preparing computerized diagrams. Even in raw materials production such as mining and logging, fewer miners and lumberjacks will be employed, as microchips are incorporated into the machinery used.

The loss of employment to automation is one of the great fears that haunt the information economy. Some prophets of doom use what they call the "horse analogy" to forecast that machines will devastate the present labour force. They argue that micro-electronics will have the same impact on human labour as the internal combustion engine had on horses; and that there is no more reason to believe that displaced workers will find employment in the new industries that are emerging from the change than that horses would have found work in the automobile industry in the 1920s. Actual experience has proved far less dramatic. In the decade or so since informatics exploded on the Canadian economy, employment has not collapsed, even though we have gone through an extremely severe international recession.

The danger lies in thinking that it has a life of its own

Despite shifts in the traditional pattern of employment — shifts of a kind which we have often seen before, such as when households stopped heating with coal — the economies of the developed countries have shown considerable resilience in the face of the technological onslaught. As long ago as 1980, a long time in terms of technological advance, 400,000 computers in the United States were said to be doing the jobs of 5 *trillion* people without throwing masses out of work. Productivity reaps its own rewards in international competitiveness and hence jobs for the workers of competitive nations. Japan has very low unemployment by western standards, yet it is known as the most productive nation of all.

As for Canada, it has no choice but to increase its productivity through technological advance if it is to maintain its place as a trading nation. Fortunately, Canadians have been rather quick to adopt informatic technology. Canadian companies are among the world leaders in satellite communications, digital switching, word processing, and computerized civil engineering. While export-oriented "high-tech" industries such as these promise fresh job opportunities for Canadians, we are learning new and more efficient ways of doing old things with micro-technology. A more productive and competitive economy will be a more prosperous economy for all Canadians in the long run.

The real danger lies in viewing technological advance as a kind of occult force with a life of its own which is beyond the control of its human creators. With computers now programming and manufacturing other computers, and with artificial intelligence built into many machines, we could easily fall prey to what Canadian communications scholar Harold Adams Innis termed the "superstition of science". It is natural to summon

up a Kafkaesque vision of armies of computers taking over the world at the bidding of a few power-crazed individuals. Stretch the imagination a little further, and you have computers and robots which defy their human masters and take over power on their own.

Keep in mind the saying: 'Garbage in, garbage out'

And indeed they do have the power to dehumanize life if their use is not controlled and firmly steered towards human betterment. Sociologists already worry about the anti-social effects on the young of computer games. They are still more worried that a class of "electronic hermits" will arise when it becomes possible, through videotext systems, to work, shop, bank, and entertain yourself without ever leaving your own doorstep: What will that do to the social intercourse which is so essential to the wellbeing of the community? Educators complain that computer-guided learning systems "program" the students and not vice-versa, leaving no opportunity for critical or intuitive thought.

Because the machines give the impression of "thinking" at stunning speed, there is a temptation to confuse the information they contain with knowledge. "Where is the knowledge we have lost in information?" T.S. Eliot wrote many years before the computer ever entered the scene. The answer is that information only becomes knowledge when it is sorted out, organized into a conclusion, and checked for accuracy.

Much of the so-called information in computers is false, biased, incomplete or garbled. An over-reliance on computerized information helps to explain some of the classic blunders in budgeting and decision-making that so often make the news. The facts and figures in the machine must be subjected to the cool scrutiny of human logic and experience. When using them, we should keep in mind the occupational slogan of computer specialists: "Garbage in, garbage out."

We should never make the mistake of believing that these machines can do our thinking for us. Despite all the talk about "smart" computers, they do not have intelligence because they do not have ideas. Rather, they are aids to human thought which can take on repetitive, laborious and time-consuming mental tasks while men and women are left free to use their minds to do what they do most usefully. The magic of the mind lies in its imaginative side — its intuition, originality and individuality. Machines do not have these qualities. They do not have the faculty of synthesizing facts and knowledge into that precious thing called wisdom. They have no critical instincts. They cannot exercise judgment. They cannot come together in discussions to produce intellectual results that are greater than each party to the discussion could achieve alone.

The question is whether we control it or it controls us

What they *can* do is provide the undigested raw materials of intellectual endeavour in a quick and convenient fashion. In the process, they are capable of helping us greatly in our striving towards the highest aspirations of mankind. The accessibility of these raw materials can help make our society more democratic and fair by giving everybody more of a voice in decision-making. It can help make it into a society which seeks wisdom through life-long learning. It can bring us close as we have ever come to forming the ideal society of which the Greek philosophers dreamed.

But to gain wisdom through technology, we must ourselves treat it wisely. We must not read too much into it or expect too much out of it; above all, we must not expect it to do our own real mental work. The great French critic of the technological age, Jacques Ellul, has written that we each have a choice between allowing ourselves to develop robot minds or becoming people who are able to use technology without being used or assimilated or dominated by it. The servant could indeed become the master if we, as a society, give way to our fears about it or regard it as a force we cannot handle. If, on the other hand, we think of what to do with it with human values first in mind, it can be made to serve us magnificently. This is what it is meant to do; whether it does or not is entirely up to us.

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