Computerizing Society

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Telematics—the interconnection between computers and telecommunications—renews and increases the stakes of national independence. No doubt the latter resides in economic health and social consensus. Some prosperous countries are satisfied with this. Others, more concerned about their stability, more nostalgic for former power, or more desirous of preserving their influence and their freedom, try to safeguard their autonomy in certain key sectors. It is from this perspective that the turning points of data processing—the development of networks and the creation of data banks—call for new actions.

Telematics and National Independence

Since the appearance of the first computers, data processing has become a strategic sector in most countries; conscious of the specific character of its raw material—information—governments quickly became interested in this industry. In fact, since 1945 few areas except the atom have received such close government scrutiny; this vigilance was an expression of the wish to limit American domination, stronger here than in any other area. Governments devoted major means to this end, each following a strategy in conformity with its own temperament. Japan set out to gather the technological knowledge necessary for the manufacture of computers. It then closed itself off to all outside meddling, setting up a Draconian protectionism. Guaranteeing outlets for its data-processing industry, it based its growth and exporting capacity on mass production. Germany, for its part, accepted American predominance right from the start. Little by little, once the basic technology had been acquired, it set about "Germanizing" the products: this is a policy it has followed in other domains, such as nuclear energy. It was thus able to forge a solid industry, positioned on export battlements. Great Britain has followed a diversified policy: the decision to support a national manufacturer made up one element of an overall plan of action in which the development of applications, the training of users, and links with telecommunications held important positions. France has carried out a Colbertist policy. The desire to build the computers necessary for the *force de frappe* made its willed character even clearer. This effort was concentrated on a single undertaking, set in the administrative domain, spurred on by a desire for technological independence, and managed according to mechanisms that closely intermingled industrial objectives and government constraints.

Strategies as diverse as these had to produce unequal results. The accelerated computerization experienced by all these countries left a more or less large share of foreign products. In 1975, American companies supplied 45 percent of the computer pool in Japan, 60.5 percent in Great Britain, 75 percent in Germany, 83.5 percent in France (after the C11 Honeywell Bull merger, the percentage was 75 percent). These overall data mask dissimilar phenomena: more or less developed technical potentials, unequal exporting capacities, and differentiated repercussions on other data-processing sectors. These contrasting situations show that the battle to reduce the position of American industry is already over, a battle aimed first and foremost at IBM because of its dominance of computer manufacturing. Today the challenge is different—IBM is going beyond data processing, and the stakes, the field of battle, and the nature of the competition have changed.

In order to face up to IBM, it is necessary to understand the reasons for its dynamism, to measure the weight of its success, and to try to anticipate its future direction. This company has played the multinational game more intelligently than any other. Supported by the American market, the world's foremost, it has known how to invade the markets of other countries. It decentralizes its industrial and commercial activity but retains control over its essential strategies in research, investment, and marketing.

It dominates the sector expected to undergo the greatest development in the coming decades—data will continue to expand in tomorrow's society, and data processing and later telematics will accompany it. IBM is entrenched, if not alone, with such reserves of power that it cannot be seriously worried. Unlike the petroleum groups, it is menaced neither by suppliers who could catch up with it from behind, nor by cartel partners whose solidarity does not exclude rivalry, nor by the uncertainties and hindrances experienced by all the conglomerates. Its place (60 to 70 percent) in the world computer market reveals its technical and commercial capacities and explains its financial strength, which supports a policy that holds all the trump cards for penetrating the data-processing market from above and below. No firm, and no government

either, has so mastered the chain extending from component to satellite.

Up to now, the source of success has been its commercial dynamism. It has submitted rigorously to the play of the market, guiding it along, yet giving in to it. For IBM, as for all data-processing manufacturers, the future will demand a different sort of activity. IBM has followed the twists and turns of the new data processing as much as it has given rise to it.

The world's foremost user of components, IBM has also sought to be the foremost manufacturer. It has succeeded in this with impressive speed and efficiency. Henceforth the company will attach exceptional importance to telecommunications. This was shown by its determination to obtain the right from the U.S. government to launch a satellite. But communications will hereafter be too overlapping and satellites too important for IBM to be content to engage in teleprocessing. Once it has committed itself to transmitting voices, images, and data, it will be led to compete with the telecommunications organizations in their traditional sphere of activity. Any government or private company that tried to respond to this strategy by concentrating exclusively on computer manufacture would be opposing yesterday's IBM, not today's, and still less tomorrow's.

The industrial response concerns all aspects of the data-processing profession: components, manufacture of mini- and paracomputer equipment, large-scale data processing, and service companies. But the sovereignty stakes have shifted to control over networks, which condition both communications control and the direction of the computer market. Paradoxically, IBM's success and the field of its new development provide governments with the opportunity to take their place as the company's intermediaries in an area where they are not so defenseless. Manufacturing and selling machines, IBM had customers and a few rivals. As a controller of networks, the company would take on a dimension extending beyond the strictly industrial sphere: it would participate, whether it wanted to or not, in the government of the planet. In effect, it has everything it needs to become one of the great world regulatory systems.

Some organizations have been or are bearers of an eschatology that ceaselessly tries to rearrange its operative machinery: for example, the Catholic Church or the Communist International. Today each of them is seeing or experiencing the difficulties this constant hubbub presents. Starting from the reverse situation, IBM has a calling to become in its turn one of the great actors on the world stage. At this very moment it has the equipment. It may be trying to hasten the commercial prospects for such a development; it is undoubtedly not measuring the political constraints. The extent of its success will sooner or later oblige IBM to take a new view of its environment; this will offer national governments the opportunity to open up a renewed dialogue with the company. Most of them are poorly prepared for this contest. They need to become aware of its novel character and strengthen their bargaining position with a solid mastery of their communications media. The difficulty lies even more in the fact that no country can play that role alone.

States were formed to establish within their boundaries an acceptable balance between the great economic and social rivalries. But the internationalization of the stakes means that today no economic Gallicanism is sufficient to keep Rome out of Armonk. Independence would be vain and as easy to outflank as a useless Maginot Line if it were not supported by an international alliance having the same objectives. Such a policy is not easy; neither is it out of reach. It would naturally be in the interest of all the players in the data-processing game, whether public or private. Each nation would thus retain the freedom to pursue its own societal projects.

On the other hand, the lack of governmental action created a void, which was quickly filled by the dynamism of IBM. If IBM were now to be "sucked in" by societal problems having political overtones which do not form part of the logic of its industrial and commercial development, it would be distracted from its vocation. In extending its domain over sectors under public control, it risks stirring up resistance and undermining its commercial effectiveness.

The development of network systems renews the old problem of relations between the state and the communications media.

IBM should try to obtain negotiations that will clearly define the boundaries between governmental prerogatives and the market. It is to be hoped that the spokesmen involved will be powerful enough that IBM will neither designate them nor take their place. It will thus be up to the state to establish this front of spokesmen for the public interest.

The development of the network systems renews the old problem of relations between the state and the communications media. This is not a simple reflex of authority, wanting to use telematics to shore up its prerogatives. The multiplicity of the economic agents it puts into contact, its ability to aid information exchanges, and its role as an instrument of power explain its importance. Without control, the state will not be able to overcome the effects of network domination or preserve sufficient freedom for each of the participants. Computerization would then be subject to influence of communications media administrators, who, for legitimate reasons of profitability, would basically seek to lock in their customers. If several manufacturers of comparable importance shared this task, it is possible, despite the risk of a cartel, that they would

neutralize each other. But the omnipotence of IBM throws the game off balance—IBM would determine the mode, the rate, and the attributes of computerization.

Controlling the network system is thus an essential objective. This requires that its framework be designed to serve the public. But it is also necessary for the state to define access standards; otherwise the manufacturers will, utilizing the available routes but subjecting them to their own protocols. In order to maintain the advantage this policy will gain them, the public authorities must immediately start preparing for the satellite phase. From this double perspective, they will find potential allies in the "telecommunications international."

The objective is to ensure open exchanges by allowing users to converse among themselves independently of their equipment. Otherwise, they could not use the hardware or services of another manufacturer. In fact, guaranteeing connections, despite the heterogeneity of both hardware and software, requires, first of all, defining common rules for the handling of messages, a form of standardization that involves the telecommunications function. But it is also necessary to unify the form in which they are broadcast and find some sort of common language and syntax. This implies specifications that encroach on the manufacturers' domain.

The level of standardization will thus shift the boundary between the manufacturers and the telecommunications organizations: it will be a bitter struggle, since it will develop out of a reciprocal play for influence. But the objective of public control indicates the strategy to follow: increase the pressure in favor of standardization.

Such a line of action, however, assumes two preconditions. The first is standardization of protocols. A complete absence of standards would be better than purely national rules. These would isolate French economic agents, depriving them of foreign connections and services and weakening their ability to compete. Further, French manufacturers would be unable to export their equipment. The second precondition is the capacity to bring all the participants to accept these constraints. Standardization constitutes a cage. If IBM did not enter, then shutting up any one of its more flexible or more dependent competitors would amount to a penalty.

No doubt the choice of such a policy can slow down the rate of technical progress: creating a durable set of unifying rules in the face of a rapid and almost uncontrolled process of development involves a delicate balance. However, given the fact of the dynamic vitality of the manufacturers and the probable reticence of some telecommunications organizations, an ambitious policy of standardization would not excessively thwart innovation. Beyond this, it is in any case important to prepare for the fundamental satellite stage.

Intended as the pivot of communications, the essential link in the development of network systems, and aimed at facilitating the increase in overlapping transmissions, satellites are at the heart of telematics. Eliminated from the satellite race, the European nations would lose an element of sovereignty with regard to NASA, which handles the launching, and with regard to the firms that specialize in managing them, especially IBM. By contrast, if they were capable of launching them, building them, and managing them, the same nations would be in a position of power. This supposes a framework of action beyond the reach of any one country.

Building satellites is the prerequisite. European industry today can produce weak satellites; from now on, it needs to prepare itself for the next generation, which will alter modes of transmission. These satellites must not constitute simple "mirrors" reflecting data from one point to another, without rules for handling and transmitting messages. Network system manufacturers would otherwise no longer be constrained to respect the principles of free access. Hence it is up to the various nations to implement protocols, playing here a role analogous to that of the X 25 for ground networks. This effort will run up against the traditional obstacles. The excess costs that these standards will impose on open lines, the risk of thwarting technical progress, and the difficulties of implementation are so many counterarguments. Without satellites, national governments would no longer be participants in the development of telematics. Yet without protocols, the satellites they could construct would amount to vain alibis.

Designing and building platforms is not enough; the satellites must still be launched. By depending on American rockets, the European countries would benefit from aid all the less warranted in proportion to their satellites' capacity to reinforce a far from negligible element of sovereignty. Without yielding to an obsession with conspiracies, it is necessary to watch out for possible convergences of interest and prevent dependence from developing in a crucial area—the launchers—while an effort is underway to limit it elsewhere, in the telematics networks. The Ariane Program seems to be going in the right direction, but it is not within the scope of this article to judge whether it may be able to place powerful satellites in orbit during the years 1985-1990. In any case, such a policy can only be conceived within an international framework. It is too costly for a single country, while the definition of protocols at the satellite level requires broad accord, as does any standardization measure.

The multiplication of international transmissions has required permanent cooperation from the telecommunications organizations. Investments made in concert, definition of rules and procedures, and the rise of financial interdependence give rise to a common approach. Certain specialized instances (CEPT at the European level, CCITT on a worldwide scale) form the traditional framework within which this telecommunications "international" finds expression.

It has undoubtedly experienced tensions and cleavages. The German telecommunications administration is apparently restive about drawing up a European satellite policy:

it would thereby lose the transit fees guaranteed it by its position in the heart of Europe. Likewise, adoption of packet-switching techniques for data transmission has not been unanimous: Great Britain, Holland, and Spain have rallied to it or are in the process of doing so, while the Nordic countries remain partisans of circuit switching. These conflicts will remain sharp so long as the problems they reflect are part of the telecommunications world.

In the face of potential rivals, the international is being reformed. This was demonstrated by adoption of the X 25 protocol for standardization of data transmission: the accord was concluded despite pressure from the computer manufacturers. The minimal solidarity is one that would create a partnership among the European nations. It would carry more weight in proportion as it received support from AT&T. Today this seems possible because of the growing competition IBM will exert over this "empire."

In short, European national sovereignty may be reinforced by joining with an American telecommunications firm whose situation makes it close, in terms of its structure and interests, to the European administrations. Of course, the risk remains that AT&T might reach an accord with IBM concerning the American and world markets, or even an agreement to share power in the world market alone, despite the lively competition they might give one another in the United States. Under such a hypothesis, the European administrations would be weakened. But this is not very likely. The interests of these behemoths are divergent; their structures and their past histories make them alien to each other.

The appearance of network systems has given rise to the development of data banks, which are multiplying, especially in Canada and the United States. Data banks change the conditions of statistics collection and retention: they infinitely expand the capacity to store data, whether it is raw data or bibliographic references. They modify access requirements and make remote examinations possible, so long as they can plug into a network. This phenomenon strikes squarely the whole of economic, technical, scientific, and academic activity. The same is true for the small firm, which henceforth will be able to go to a specialized bank to find such and such a manufacturing process; and for the forecasting arm of a large company, which will have available all the data concerning the outlook for economy. All of these data existed before the installation of data banks, but most of the time they were scattered, unmanageable, and difficult to use. It is ease of access that creates the need. Two users, one of whom makes intelligent use of data banks while the other is content with sparse traditional information, find their positions in the economic game modified as a result. It is the same for academic work, or the search for commercial loopholes by a large firm.

Data banks are often international, and the development of transmissions allows access to them without excessive tariff penalties from any point on the globe. Hence the temptation in some countries to utilize American data banks without setting up their own. Indifference to this phenomenon is based on the belief that this dependence will be no stronger and no more disturbing than for any other type of supply. But the risk has a different character. Information is inseparable from its organization and its mode of storage. In the long run, it is not only a question of the advantage that may be conferred by familiarity with such and such a set of data. Knowledge will end up by being shaped, as it always has been, by the available stock of information. Leaving to others—i.e., to American data banks—the responsibility for organizing this "collective memory" while being content to plumb it is to accept a form of cultural alienation. Installing data banks is an imperative of national sovereignty.

Data banks are not all alike. Some may remain the property of closed groups and professions whose members are not very numerous, while others must be accessible to everyone, under penalty of affecting the balance of power. The former are intended for the few, while the latter support, for example, national forecasting and planning. The first develop solely by the initiative of future users, while the second require vigorous involvement on the part of public authorities. The creation, diffusion, and regulation of access to these data banks conceals a problem of a political nature. This article cannot deal with all the legal and ethical questions raised by this rapid development. Only their general orientation warrants being underscored: it is not clear that all the major departments of the government—the universities, INSEE, the technical ministries—have perceived the strategic importance of data banks. Witness, for example, the little use that the major French economic institutions make of the international banks, although they would seem to be the base on which to build a national equivalent. Under these conditions, it is the government's responsibility to take the initiative and to give legal and financial support to the entities competent to carry out this task. Such action would gain in breadth and effectiveness if the public authorities developed a data-bank plan, verifying the institutions to be created, avoiding useless crosschecking, and determining those responsible for implementing them. This is the policy followed in particular by the German Federal Republic.

Telematics and Cultural Conflicts

Data processing makes possible and accelerates the rise of a very highly productive society, with less but more effective work and jobs very different from those imposed by industrial life. This change has begun: a great decrease in the labor force in the primary and secondary sectors, an increase in services, and above all a multiplication of activities in which information is the raw material. It will be accompanied by a change in the structure of organizations and by fluctuations in attitudes toward work.

Since the last war, great industrial conglomerates have grown up, governed by the law of increasing yields. For certain types of production, this will continue: it will be

necessary to accept their constraints, without excessive illusions about the improvements, such as profit sharing and amenities, compatible with the discipline that is one of their intrinsic features. However, numerous examples show that the new techniques, and especially those related to automation and data processing, can multiply the areas in which the small organization is superior to the large one in effectiveness. The social tensions, the entropy, and the vulnerability typical of overlarge institutions will lead to a generalization of this spreading out of production: the workshop will replace the factory, the branch office will replace the conglomerate. Gradually, therefore, industry will come to play a smaller role, and many of its installations will be split. Furthermore, the general trend of society will require a decreasing amount of productive work. In terms of total volume, this evolution is inevitable.

The traditional social scene will tend to become less structured as it passes from an industrial, organic society to a polymorphous information society. Relations based on production will no longer be the single matrix of social life. Rivalries will no longer be between two classes structured by their place in the industrial process but among innumerable mobile groups, conditioned by the diversity of their membership and their projects. The source and the scope of such conflicts will extend to the entire society.

How will the confrontation between these groups distribute the tasks and the rewards of productive employment, the definition of its ends? Within a world in which the "value of work" will be eliminated, will work as value lose its importance? As a result of religious heritage and daily practice, its socializing virtues and security value have made it the cornerstone of social organization over the centuries.

Data processing is introducing a phenomenon comparable to that introduced by the appearance of writing.

Will the remaining productive activity be the duty of the reserve army of immigrants making up the lower proletariat and the prerogative of a few neurotics produced within the great incubators of technology? Will there remain a "working class" or will work, on the other hand, be distributed among a more numerous population, but one divided between a main activity providing social status and protection and a multitude of occupations devoted to forms of production outside the traditional commercial channels, to the enjoyment of leisure, or simply to social life?

Which rules, which common values will govern the inevitable coexistence of at least three forms of collective organizations: large enterprises devoted to rationalization and maximum productivity; small working units opening the way for innovation, for new products, and for new consumption, and whose law will remain aggressiveness, risk taking, and the quest for maximum profits; and public services, cooperatives, associations, and highly decentralized groups, with little concern about economic and financial returns, but consumers of labor and providers of amenities? How, within a convivial society under the constraint of external stability, will the subtle balance be established between two worlds as foreign to each other but also as indispensable to each other as the nuclear world and that of Illich?

The deplacement of conflict is beginning to be felt in most modern countries. Conflicts will continue to appear in business for a long time, but what triggers them is gradually moving to other areas of confrontation: the city, health, education, and so on. The 1968 student riots were a first sign of this transformation, which has been prolonged by the ecological movement. The proliferation of social life, the perception of solidarity in opposition, in neighborhood, and in leisure, show new desires, cause new experiences, and demonstrate the presence of tensions foreign to the world of production. These movements are so well perceived that current political life is a race to entice them.

Nevertheless, they are only starting the transition toward the very highly productive society, where conflicts will predominantly be over cultural factors and where appropriating them will become the moving force of history. It is then that slowly but surely telematics will affect the major instruments of culture: language, in its relations to the individual, and even in its social function; and knowledge, as an extension of collective memory and as a tool for achieving the equality or discrimination of social groups.

As the Sumerians were writing the first hieroglyphs on wax tablets, they were living, probably without realizing it, through a decisive change for mankind: the appearance of writing. And yet it was going to change the world. At the present time, data processing is perhaps introducing a comparable phenomenon. The analogies are striking: extension of memory; proliferation and changes in information systems; possibly a change in the models of authority. The astonishing similarities may be farfetched. The importance of this transformation, however, remains incomprehensible to those who live through it, unless it is considered from the viewpoint of Fabrice at Waterloo. Even a method is lacking: if data processing in the long run produces a decisive change in language and in knowledge, it will involve changes in thinking, in concepts, and in reasoning, which will slowly obliterate the tools used to forecast them. What to do? Only to ask questions without answers and give answers with no pretense of doing anything other than raising new questions.

The enormous spread of data processing that will occur when access vocabulary is standardized will affect lan-

guage and syntax. By penetrating into the activities based on communication (office work, preparation of legal instruments, composition of texts, and so on), telematics resorts to an apparently vehicular language that actually is of a different nature, because it is modular. As a short-term example, office data processing attempts to reproduce dialogues in a manner strictly limited to its requirements and is inventing a simplified language in order to communicate at minimum cost. This evolution will prevail over the years: it combines ease and effectiveness by sacrificing part of the content, to which intellectuals are more sensitive than managers.

In the first period, this application of data processing to writing will affect the texts that are poorest in "signifiers." This will not be a major change in relation to a mode of writing that is already repetitive and mechanical. But beyond that? Where will processed communication stop, when households begin to be equipped with computers? This question might appear to be unwarranted without the precedent of electronic calculators. Fifteen years ago, nobody would have imagined the proliferation of cheap devices available to everybody and especially to students. Today, the question is no longer whether mental calculation is going to become less important but when it is going to disappear.

What will traditional writing become when a processed language, a poorer one but one sufficient to express the essential meaning of messages related to daily life, becomes available to everybody? Language translates and generates a method of organization: to touch it is to shake society itself. In effect, it produces and reproduces the social hierarchy; certainly, the speech of the lower classes is now more remote from that of the dominant classes than their respective lifestyles. Cultural inequality is by now predominant, and language plays a major role in it. Will the general adoption of processed language favor emancipation or will it emphasize the differences? It will not affect each user equally. Doubtless, it will not stop being improved and will become capable of more and more elaborate dialogues. But its propagation among the different social classes will not be uniform: they will not show equal resistance to the introduction of a codified and abbreviated language. Their permeability will depend upon their cultural level, and since the latter is not similar, telematics will have a discriminatory effect. More than ever, language will become a stake of culture. Opposing groups will struggle to appropriate it.

The cultural model of a society also depends on its memory, control of which largely conditions the hierarchy of power. Access to infinitely greater sources of information will entail basic changes and will affect the social structure by modifying the procedures for acquiring knowledge.

With telematics, the storage of information changes in size and in nature. Storage in computers requires an organizational effort, based on both technical constraints and financial imperatives. The establishment of data banks will be the beginning of a rapid restructuring of knowledge, following patterns that now are difficult to define. The change will take place on the initiative of the sponsors of such banks, most probably in the United States. Therefore, criteria originating from the American cultural model will prevail.

Thus data processing runs the risk of being the source of one of those discontinuities around which knowledge revolves. The boundaries of disciplines will be more fluid, more mobile, because they will be the result of multiple codifications, of scattered endeavors without direction or design. Related primarily to the nature of data banks, this evolution will thus reflect the influence of American culture, which is not organized into battle corps and does not establish guilds. The multiplication of configurations will reduce the importance of unifying classifications; knowledge will then lose the comforting support of a tradition and of a sociology. Will it gain an ounce of freedom from it?

Data processing will also revolutionize an individual culture that mainly consists in the accumulation of exact knowledge. Discrimination will then be based less on the storage of knowledge than on the ability to research and use it. Concepts will prevail over facts, iteration over recitation. Accepting this transformation will constitute a Copernican revolution for pedagogy. The priority given to the acquisition of a universal microknowledge is now related to a concept of culture whose permanence is ensured by the school. This is inseparable from the sociological features of the world of schools and universities, of the special merit system on which it is based, and of the ideology that prevails among the teachers. The oscillation toward learning structures and concepts will certainly take place slowly. It will open with a period in which teaching will not yet be adjusted to the metamorphosis represented by the data banks. During that period, children, for whom the school is the principal cultural mold, will be defenseless before this new approach to knowledge.

All changes in knowledge are accompanied by social changes. The rise of the middle class was simultaneous with that of the book, the appearance of the technocratic classes with the development of economics, sociology, and psychology; that is, the new disciplines that enriched the methods by which power could be exercised. The telematics revolution will have consequences that cannot be evaluated at the present time. One must have a very static concept of social change to regard it as a "game of goose" in which one group retreats a few steps and another group advances by a few steps known in advance.□

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