Viewpoint

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Microseconds and Macropolicy

ON JANUARY 8, 1815, Andrew Jackson's army defeated the British at the Battle of New Orleans. What makes the battle particularly noteworthy is that it was fought more than two weeks after the signing of the Treaty of Ghent had ended the war. A great many men died because a sailing ship carrying news of that treaty did not arrive in time to prevent the battle.

Today we routinely watch our secretary of state on live television as he steps off his plane in distant capitals and delivers his views on world problems. The implements of war have also changed. Our "fir-built frigates," the world's fastest in 1812, have been replaced by ICBMs that cross the ocean in twenty-odd minutes.

The flow of real-time information about political, military, and economic events is now both routine and prolix. But is our government organized to deal effectively with what can only be described as a new situation in the world? At this point in our national development we do not seem to have in place the structure to formulate policy on information flows —especially their global aspects—let alone to implement it. Indeed, we have given relatively little thought even to understanding what kinds of policy problems we are dealing with, and what vital interests may be at stake for America. This is not an unusual posture in the long history of governments' reactions to technological revolutions.

Revolution and Reaction

Each new age of technology has affected old power structures and changed the political landscape. When a man's wealth was expressed

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by the amount of land he owned, the sovereign, no matter how bad his economic or political policies, did not have to worry about the flight of capital. You literally could not move the farm. Then the invention of money and the development of industrial and service economies made capital mobile. And the invention of the railroad profoundly changed our society because, among other things, for the first time it gave real mobility to labor. Men and women could escape a harsh working environment for a better one. As goods and people moved across the land toward better opportunities and new markets, the railroad track became the iron strap that bound whole continents together.

Following close on the heels of the railway came a second revolutionary technology, the automobile, which once again dramatically changed the way we live and work. In 1947, William Harlan Hale wrote a layman's history of the United States that illuminated the automobile's role in transforming society in a manner few history books do:

> The car made for private freedom, and especially for the kind of freedom which the arbiters of taste and enjoyment in the big cities were not promoting. . . . It was a declaration of independence against every form of rigid and ancestral control: against the inflexible railroad, against the self-enclosed little community, against the paternalistic family, and against all the inbred customs that had survived from a slow-moving earlier day into the age of speed and power.

Unsurprisingly, every great technological revolution in history has made the ruling classes nervous, because they sensed—correctly —that somehow their power was being undermined. Sovereigns reacted to the new mobility of capital by inventing exchange controls. The railroads were locked into the grip of govern-

ment regulation until their number and power dwindled as their monopoly eroded through the competition of trucks, barges, and airplanes. While governments regulated transportation, most if not all of them created a monopoly on the delivery of letters. Some say the Stuart kings created the government postal monopoly in order to censor the mail of dissidents.

As new means of communication came along, governments reacted with caution. The Royal Post of England took over the telephone from private hands and slowed its development down to a walk. In 1879, Sir William Preece, the chief engineer of the British Post Office, testified in the House of Commons that the telephone had little future in Britain. "There are conditions in America which necessitate the use of such instruments more than here. Here we have a superabundance of messengers. . . . The absence of servants has compelled the Americans to adopt communications systems." America was lucky: although we set up a government postal monopoly, we did not let it take over our telephone service.

Information Comes of Age

The first computer was probably designed by Alan Turing in England in 1943 to help crack the Nazi ciphers. It was called Colossus and employed some 2,000 vacuum tubes as digital on-off switches. At about the same time two Americans were also at work for the U.S. Army building a computer called Eniac. It had more than 17,000 tubes and was designed for calculating trajectories of shells and missiles.

From this wartime effort we have moved through various phases to the current microcomputers that have now been married to telecommunications to produce something new under the sun. The onrushing age of information technology gives a whole new dimension to the sovereign's worry about loss of control over men and money. Just as the automobile changed our society in ways that are still unfolding, so today, the third great revolution—the rise of the information society—is affecting the way we live and work.

In the past, machines were inflexible, in the sense that the user had to adapt his uses to the function of the machine. A drill press, for example, could only be used for one type of opera-

tion. And if a bank wanted to find a customer's balance on a certain date, it had to run the file of all customers' accounts, because the early computer was a sequential, plodding device, somewhat like the old drill press. With today's information technology, the drill press can produce whatever product the user wants. And with programmable software and the "random access" memory, the computer can be made to retrieve and do what its owner wants—and more. This combination of technologies creates a kind of hydraulics of the mind that is truly revolutionary.

The information revolution, moreover, differs fundamentally from the other technological revolutions that have preceded it. One big difference is that, unlike the situation in the railroad and automobile industries, great sums of capital are not required to start up a successful venture in the information business. The entrepreneurs who put together the chips and write the software know that access to knowledge is more important than money. An individual sitting before his personal computer anywhere in the world can command in microseconds vast amounts of information stored in the data bases of the world. Information is becoming the new capital. While some argue that it is simply another commodity, it is really very different from any commodity we have ever seen before. Unlike commodities, information is not used up, though it can go stale and thus may lose its value.

For all these reasons, the information revolution is having a profound impact in many diverse areas. The ancient and basic concept of sovereignty, which has been discussed since the time of Plato, is being eroded by the new technology. Geostationary satellites launched and owned by one country have the capacity to transmit data to other countries. Copyright laws based on Gutenberg's movable type have been overtaken by a technology that allows printers at 100 different locations to spew out identical texts in seconds. The global marketplace has, in addition, fundamentally changed the nature and stability of monopolies.

At the moment, the United States can probably marshal more computer power, more telecommunications skills, more data banks, and more venture capitalists producing new software than any other country in the world. How long we can maintain this position no one

knows. Even the most powerful cartels decay over time, as OPEC is now learning. If we were ever in a position to be a kind of OPEC of information, that time has passed. Our position is eroding at the very moment when the free flow of data is now almost as important to world commerce as the free flow of goods.

International Reaction

While science has been moving the world closer together, the politicians have been busy trying to keep it apart. Many foreign governments fear the effect of electronic information flows on their ability to control the flow of news to their own citizens; some fear the perceived threat to their citizens' personal privacy; some understand that the new technology makes possible the very rapid shift of resources out of their national jurisdiction; some fear the loss of their technology base; some see a threat to their own telecommunications industry or to the monopoly position of their government-owned telegraph and telephone system. Underlying it all, governments wonder if the new information age will shrink their tax base.

As more and more countries come to understand the importance of telecommunications linked to computers, governments are beginning to treat information as they once treated goods. We are seeing the growth of a kind of electronic mercantilism as sovereigns move to protect their power. Many governments are nervous if they cannot read our electronic mail. Some now require that the codes used by private communicators to preserve data privacy be registered with government agencies. It is the same principle governments used to invoke to justify steaming open envelopes, and creates the same policy dilemma.

More often than not, governments all over the world are reacting to the information revolution in the classic manner, by attempting to regulate, tax, and control the new technology. But this is not as easy as it seems. The use of satellites has now made a mockery of national censorship. No customs agent can stop a stream of electrons coming into his country from some 22,000 miles in space. Once people learn about alternatives, there cannot be politics as usual. History teaches that change occurs when people learn there is an alternative to what they be-

lieved was their lot in life. A minor but illustrative example of this occurred in Denmark. After allowing the broadcast of a few episodes of the TV program *Dallas*, the government canceled the show. A public outcry forced reinstatement of the broadcast. It is an unhappy fact that the number of governments in the world that encourage the free flow of news and data of all kinds is a small minority.

At the same time, it is becoming increasingly common for critical software and other intellectual property to be stolen from this country by people overseas and then resold back to us. The pharmaceutical industry is a case in point. When the Pfizer company introduced a new anti-arthritic drug (Feldene) in Argentina a few years ago, five Argentine companies already had generic copies of Feldene on the market. This kind of story has been repeated hundreds of times, in many parts of the world. The desire of the less developed countries and Eastern bloc nations to be on the receiving end of technology transfer is as natural as their wish to import vital machine parts. And *we* are inadvertently helping them. The Freedom of Information Act, designed to help citizens find out about the operations of government, is now being used to discover our latest technology and transfer it abroad without compensation.

Domestic Reaction

In 1980, after seven years of study and the expenditure of excessive amounts of taxpayers' money, the Federal Communications Commission gave up trying to determine where computing stops and telecommunications starts— gave up, that is, rules barring AT&T from entering the computer business. The effect of the bureaucratic delay on AT&T and IBM—and therefore on America's competitive position in the world—was immense. At a time when other countries were rapidly integrating computers and communications, there did not appear to be any central recognition within our government of the strategic importance of information technology. Meanwhile we all watched as a federal judge, doubtless doing his best, oversaw the breakup of the finest telephone system in the world and designed a new one in his courtroom, with no apparent concern for

America's defense capability or our position in the world. Perhaps we still labor under the illusion that we really do not live in a global marketplace—that technology stays within political borders.

Yet, as the world marketplace has moved from slogan to reality, an awareness has been growing in this country about how heavily the world relies on the free flow of data across national borders. This reality is not yet fully appreciated, but its recognition must and will become central in the formation of policy on this matter. The flow of data affects the safety of the planes we fly in, the words we read, the TV programs we watch, the missiles that defend us, and the conduct and control of business, both public and private. All of this in turn affects the way we structure our society and creates a pressing need for the United States to put together and implement a policy on domestic and international information flow. We have not yet done so.

• What is, or should be, our policy on foreign taxation of transborder data flows? What should our response be when a foreign country asks U.S. multinational companies to register their computer codes with a government agency —or when a government-owned telephone and telegraph company charges U.S. companies more for telephone lines than it charges its own nationals, or even denies companies lines that are vital for the conduct of business? Congress recognized the importance of questions such as these in 1984 when it extended section 301 of the Trade Act of 1974 to cover the proliferation of non-tariff barriers to trade in services, including "restrictions on the use of data processing facilities" and "direct or indirect restrictions on the transfer of information." This new law is a step toward giving services equal standing with other vital exports. It authorizes the President to respond to protectionism in the services area as well as in goods. It also authorizes the President to promote bilateral and multilateral trade negotiations to remove foreign barriers to U.S. service exports, including requirements that data be processed locally and other barriers to international information flows. Since much of the world's development depends on keeping these circuits open, we must give still more priority to implementing an American policy that encourages the free flow of international information.

U.S. regulators at last November's meeting of the General Agreement on Tariffs and Trade understood this need. At that meeting GATT—created in 1948 to bring about contractually binding multilateral reductions in trade barriers—agreed to study whether communications services can come within its framework. This decision is a giant step toward defining and then resolving the emerging issues of the information age.

• What is, or should be, our policy when foreign governments permit their nationals to steal our research, or our policy on keeping national secrets secret? The lead we enjoy in information technology was created by men and women from Silicon Valley on one coast to Route 128 on the other. Our advantage rests on our unstructured society that encourages innovation. More than half of America's net employment growth in the five years ending in 1981 came from firms with twenty or fewer employees. But these firms are producing new technology faster than our government has produced new policies to protect it. Since American competitiveness will depend more and more on advanced technology, restoring the effectiveness of our patents and copyrights is a new and urgent policy challenge.

• Finally, what should our policy be on allocating slots in the geostationary arc? Should we support demands from some developing nations for access to that arc? Or should we hold to the position that the arc belongs to those who use it—the countries that have actually launched the satellites?

BECAUSE INFORMATION TECHNOLOGY cuts across all sectors of our society and affects both our domestic and foreign policies, it is not surprising that there is no particular part of our government that is in charge of formulating policy to answer these questions. Policy is currently split among the Department of State, the U.S. Trade Representative, the Department of Commerce, the Federal Communications Commission, and several other agencies. We have a number of ad hoc groups attempting to reconcile turf problems, but that may not be enough. The hour grows late. Providing a focus for our government's international information policy is, I suggest, a national issue that deserves our best thinking and best efforts. ■