TO INFORM OR TO CONTROL?

The New Communications NETWORKS

Oswald H. Ganley and Gladys D. Ganley

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TO OUR CHILDREN,
Robert and Delia

Preface

AT first glance the topics dealt with in this book may appear to be a string of different subjects with only minor or perhaps no relationships to each other. The assembly of a whole picture from these apparently disparate fragments is the purpose of this book.

Over the past few decades, the responsibilities and interests of all our leaders—in government, in businesses, in industries, and in universities—have become increasingly specialized and categorized. Hence, when a tidal wave like that produced by computers, communications, and information sweeps through, each leader sees only some minute part of it. Even as the foundations of his most vital interests are being torn away by the flood, he remains unaware that his castle is crumbling. Or even as opportunities pile up before him, he ignores them in the struggle to shore up traditional infrastructures.

What we are witnessing on every hand today is the beginning of the collapse of economies based on traditional industries, *traditionally managed*, and the rise of economies based on or assisted by new communications and information resources. These economies are first of all global and only sec-

ondarily national. For communications and information resources have moved great blocks of activity beyond national borders. Whole industries, businesses, money markets, currency flows, banking, energy resources, and defense systems—and communications and information itself—have gone global. Most of our stakes are now global. But governments have not gone global. Many groups now operate outside the framework of nation states, and certain events have escaped national control. Still, we can expect that for the foreseeable future the *responsibility,* if not the *power,* to decide and to arbitrate will continue to rest with the nation state.

The story of communications and information has recently changed radically, so we have begun at the beginning. We think it is important for our readers to know the physical armamentarium of what amounts to a revolution and how it is presently deployed. We want them to be able to see the ferment which is building in the United States domestically, and the often different ferment taking place abroad. We want them to sense the collision course.

We show the reader how areas of domestic U.S. activity which once had boundaries are now flowing like lava into each other. We describe the domestic roadblocks they meet, which used to be helpful channels, and which were devised long ago to serve other purposes.

We jump across the U.S. border and take up several specific international problem areas. All of these are of a nature vital to the very survival of the United States in a position of global leadership. And all are merely symptomatic of what is to come.

We then relate these activities to the broad geopolitical areas of interest to the United States: the industrialized countries, the developing countries, and the communist countries. We give one case history, that of the relationships of the United States and Canada, as they range across the broad communications and information spectrum. We find, in this single instance, that new communications and information developments are prominent in whatever we do and actively affect events both positively and negatively.

And we have found this to be true wherever we have looked, on both a domestic and a global basis: in industry, in manufacturing, in banking, in currency markets, in business, in government, in transportation, in recreation, in trade, in defense, in security, in arms control, in intelligence gathering, in terroristic activities—you name it.

There is no end to the opportunities now opening up, and no simple answers to arising problems. All the king's horses and all the king's men cannot supply the answers today, for most of the questions have yet to be formulated. This book describes the situation as we enter the 1980s, which will be a decade of worldwide change. It points to the broad routes these changes will take, and erects certain signposts along the way.

Hewsam Ryan, William Salmon, Naomi Seligman, Wells Stabler, Ronald Stowe, Raymond Vernon, and Eugene Yeates.

These persons are not, however, responsible for or necessarily in agreement with the views expressed herein, nor should they be blamed for any errors of fact or interpretation.

OSWALD H. GANLEY
GLADYS D. GANLEY

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Illustrations

". . . Communication can be an instrument of power, a revolutionary weapon, a commercial product, or a means of education; it can serve the ends of either liberation or of oppression, of either the growth of the individual personality or of drilling human beings into uniformity. Each society must choose the best way to approach the task facing all of us and to find the means to overcome the material, social and political constraints that impede progress."

From the Final Report of the MacBride Commission,
UNESCO, Belgrade, Fall 1980

"We can either work to shape, in a wise and effective manner, the changes that now engulf the world or, by acting unwisely, become shackled by them."

Cyrus R. Vance, Former Secretary of State,
Harvard Commencement Address, June 5, 1980

THE BIRTH OF A NEW ECONOMIC SECTOR

Part I

The Challenge to America*

1

THROUGHOUT the 1960s, and especially the 1970s, vast changes have been taking place within the U.S. electronics industry which have directly affected communications and information. In a climate of general economic gloom, innovation after innovation has leaped forth: in computers, microprocessors, semiconductors, and chip technology; in telecommunications, digitization, packet switching, microwave, laser, and fiber optics; and in the electronic media, cable television and television-related devices. In space electronics, a whole new realm of communications and information devices has linked the globe, with the advent of satellites for navigation, weather, communications, remote sensing, and military and security uses.

These electronic innovations have moved the communications and information industries rapidly forward, even as many more traditional industries have stagnated and declined. And they have spilled over and met with similar burgeoning, though not yet quite so advanced, electronics industries in

* With apologies to Jean Jacques Servan-Schreiber's *The American Challenge* of the late 1960s.[1]

From Scarcity to Abundance

2

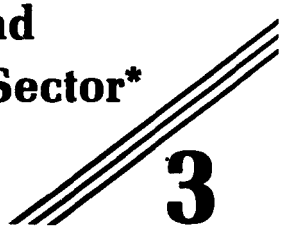
INFORMATION has always traveled by the fastest or most convenient means for communicating it, whether that be by speaking, yelling, smoke signaling, beating drums, sending a runner with a message, entrusting a note to a packet boat, the pony express, or a carrier pigeon; posting or flashing lights; writing, printing, and distributing books, newspapers, and magazines; or making use of the postal system.

Whether the information was spoken, handwritten, printed with ink, or recorded on wax, film, or magnetic tape, the purpose has always been the same: To take whatever information was available and convey it to someone for social, informative, entertainment, educational, financial, commercial, political, or military ends. In this sense, nothing has ever changed.

New Technologies Spew Forth

Communications and information resources cover a broad spectrum and are of varying ages. Printing with movable type and books, more or less as we know them, have been available for half a millennium. Newspapers have been around for more

Dynamics within the U.S. Communications and Information Resources Sector*



3

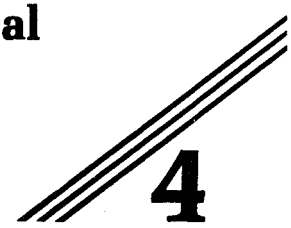
THERE are many facets to communications and information resources, and each is important as technologies grow and customs change. Each facet shifts under its own pressures. And when they join to form new patterns, it's a whole new ball game.

Fundamental Shifts

The first facet is the *conduit,* or the physical channel by which information travels. This may be a system like the postal system, or it may be a specific physical channel such as coaxial cable, satellites, or optical fibers. The second facet is the *content,* or the information the medium contains. Things like news, entertainment, advertising, and financial or other data

* The concepts discussed in this chapter are substantially based on the work done by Harvard's Program on Information Resources Policy, and especially on the work of Benjamin Compaine and John McLaughlin.[1]

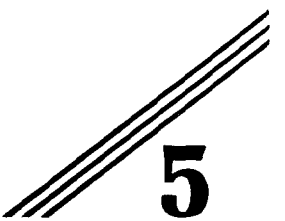
Communications and Information Dynamics within General U.S. Industry



As early as 1970, researchers found that about half of the U.S. labor force was working in communications and information-related jobs, and about half of U.S. labor income was derived from communications and information-related sources.[1] Figures approaching this amount are available for other advanced countries. This concept was and still is ridiculed by most of general industry, where the equivalent of the following is said: If half of everything derives from communications and information resources, then where do you fit in things like steel and cotton balls?

All major U.S. industries have installed computers and other communications and information devices. But most tend to consider them as mere administrative and clerical aids. There is a figure of about 2 or 2.5 percent which most major companies will cite as their communications and information-resources expenditures, regardless of how they actually use

The World Picks Up the Economic Challenge

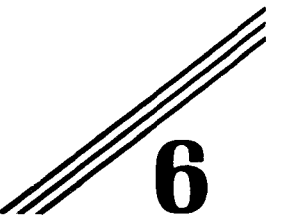


WHILE the United States enjoys a head start in the communications and information resources area, and a positive balance of trade in high electronics, it should not believe that the rest of the world is standing idly by.*

Governments of other developed nations have, indeed, been quicker to recognize the revolutionary nature of these new knowledge-based technologies, products, and techiques than has the United States. They refer to the coming of a "second industrial revolution" based on these fields, and they are determined to play an active part. These new technologies, they believe, are absolutely vital to their future economic, security, and national sovereignty interests. They intend, therefore, to resist dependence on the United States in the communications and information area, or at least to keep that dependence to an absolute minimum. To do so, they are simultaneously bettering their own positions, while at the same

* The Communist countries do not at this time represent a competitive *economic* force in the communications and information area.

Regulatory Activities in Communications and Information Competition



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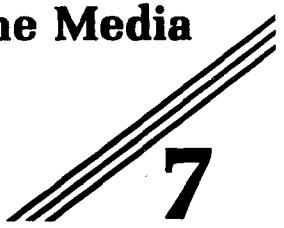
GOVERNMENTS around the world are involved in daily decision making which can free up or restrict trade. This includes arranging for compatibility, setting standards, licensing foreign companies, levying taxes, procuring products and services, restricting ownership, and setting tariff rates.

Without compatibility, today's telecommunications would be impossible. In the nineteenth century, when different systems resided within each national border, international communications by telephone and telegraph virtually did not exist. Early on, precursor organizations of the International Telecommunication Union were established to make arrangements to permit international message flow. And there is a similar need today for international standardization of interconnections between computer and telecommunications networks. The philosophy of the computer industry, which works with proprietary standards to enhance each participant's position in the marketplace, must be merged with the telecommu-

The Changing Role of the Media in International Affairs



WHILE the communications and information industries and their contributions to general industry are enormously important in domestic and world affairs, it is the media and related information which strike at the greatest sensitivities of nations. Books, newspapers, magazines, television and radio programming, films, records, advertising—and even scientific data bases and technological know-how—all embody a cultural content which can in no way be politically inert. Economically, it is often more feasible for countries to buy U.S. films, television programming, and magazines than it is to produce these materials at home. It is also cheaper in many instances to rely on Western or U.S. news-gathering resources than it is to provide national ones. But new U.S. technological possibilities for media access to almost any part of the world, coupled with a vast increase in trade in media products internationally, are intensifying the distrust nations almost invariably feel when the culture of a foreign nation crosses their borders.

SPECIFIC INTERNATIONAL PROBLEM AREAS

Part II

"Free Flow Forever" vs. "Objective and Balanced News"

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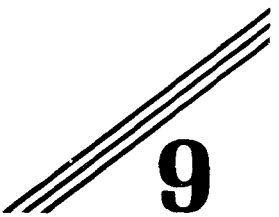
The imbalances which are a feature of communication flows the world over represent serious obstacles to Third World countries in their efforts to achieve positive development, as well as hindering attempts to promote genuine co-operation, on an equal footing, between them and the industrialized countries.

Until now, certain regions and certain categories of people spoke and the rest listened. This situation can no longer be tolerated. . . .[1]

THERE are many contradictions from country to country in the demands of the various developing nations regarding communications and information. But there is clearly an enormous distance between U.S. insistence on the sanctity of the free flow of international news regardless of any other consideration, and the collective developing world demand that news about their countries be reported on their terms. The U.S. position in this conflict has been referred to by critics as insistence on "free flow forever," and the developing world

Transborder Data Flow (TBDF)* Restrictions



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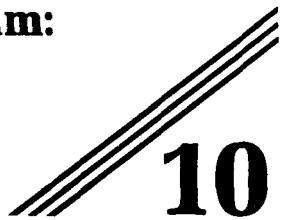
WITH the first subconscious recognition that something new, important, and disturbing was happening all across the communications and information spectrum internationally, government and business leaders—primarily in advanced countries—began to clutch onto TBDF as a somewhat discrete thing which they could attempt to control. The very term "transborder data flow" thus became a kind of shorthand through which nations could express their fears about a changing future and could plot possible ways to "do something" about it.

By defining transborder data flow as "the flow across borders of any kind of material which is computer readable,"† it seemed for a time that this one problem might indeed be circumscribed and held within manageable bounds. But the problem is much wider than at first supposed. The following

* TDF is another abbreviation in use, but it ignores the all-important border.

† Most European national data protection laws and the Council of Europe draft treaty on privacy deal only with computer readable data.

Dividing Up the Spectrum: WARC '79



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AFTER four years of preparation involving more than half a dozen U.S. government agencies, the Congress, and the private sector, a U.S. delegation of 69 people set off for Geneva in September 1979. There they would join nearly 2000 delegates from 149 other countries for a ten-week twentieth-century marathon.

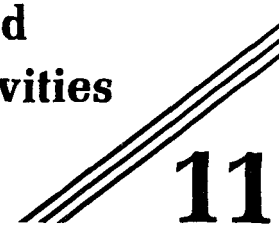
The occasion: The World Administrative Radio Conference (WARC '79).

The mandate: To consider some 15,000 proposals which would allocate world frequency bands until the next plenary conference—then scheduled for 1999.

The last such conference, which has been customarily held at twenty-year intervals, had taken place in 1959. But in the twenty-year time span since that plenary session of the International Telecommunication Union (ITU),* the geography

* ITU—International Telecommunication Union—is the organization responsible for the world's radio spectrum allocations. It is a specialized agency of the United Nations.

Expanding International Satellite Capabilities and Two Controversial Activities



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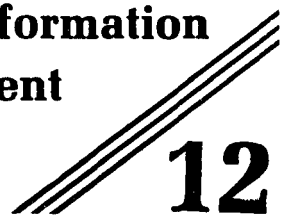
FOR almost two decades—the 1960s and most of the 1970s—the United States and the USSR held a monopoly on the world's satellite capabilities. Until recently, they were the only two countries with the combination of a large economic base, a large background industry and administrative management capability, and sufficient motivation to devote huge resources to the activity. They therefore maintained command of both launch capabilities and of the satellite technology itself.

But this situation is changing. France and Germany together now have an experimental communications satellite, the Symphonie. More important is the French Telecom I planned for 1984. This system, now an EC-wide effort, was designed as an answer to Satellite Business Systems and aimed at the business market.[1] And through French efforts especially, the European Space Agency (ESA) has a viable launch system called Ariane. Since the U.S. space shuttle, counted on for

Communications and Information Resources in Development



OVER the past several years, various institutional and individual reports and studies have insisted that communications and information resources are essential to development strategies. A comment like this one from a National Academy of Sciences paper is not uncommon:[1]

. . . Improved communications can now help break down rural isolation and promote better education and health care, changes in urban design and more dispersed regional settlement. Recent reductions in costs and improvements in performance indicate that improved communications technologies could become a major new force in development.

An Agency for International Development (AID) report to the U.S. Congress echos the thought:[2]

Communications systems are a crucial part of the economic and social infrastructure of modern nations; developing countries need

Electronic Security and Defense Systems, Including Command, Control, Communications, and Intelligence (C^3I)

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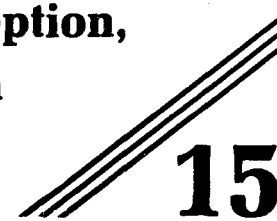
THE electronic warfare equipment business in the United States—communications and information devices and systems for national security and defense purposes—has grown from about a $500 million industry in 1974 to a $3.5 billion industry in 1980. This figure is expected to reach $5.7 billion by 1983.[1] This is not an industry which the U.S. can choose to support or not to support. It is one many say *must* be supported to maintain military parity with the Soviet Union.

While radio communications and signal intelligence played an important role in World War I, the use of radar during World War II's Battle of Britain marked the real beginning of today's sophisticated communications and information-based defense systems. The detection of enemy aircraft, the careful ground control, the instructions from the ground to airborne pilots, and operational research to focus defense strat-

Arms Control and the Role of Communications and Information in Peacekeeping

THE 1979 Senate Salt II Treaty ratification debates centered in large part on the adequacy of U.S. spy satellites, electronic monitoring, telemetry data, and other kinds of intelligence intercepts to verify points of agreement between the United States and the Soviet Union. "National means of verification" was indeed the central concept of this treaty, which has been shelved due to international crises in Cuba, Iran, and Afghanistan. This international treaty, like Salt I, proposed to give legitimacy to the use of communications and information resources by a foreign power in outer space for technical intelligence operations over the territory of another sovereign state. In other words, there was a gentleman's agreement between the two parties to permit each other, under certain conditions, to spy.

The Widening Role of Electronic Codes, Message Interception, and Message Protection



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SIGNAL security (COMSEC)—the coding and other ways of securing U.S. government messages for transmission—and signal intelligence (SIGINT)—the interception and decoding of the messages of others by the U.S. government—are both National Security Agency activities.[1]

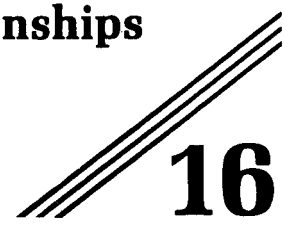
COMSEC activities have been described as including:[2]

> . . . all ways of keeping secret both human messages, such as telegrams and telephone conversations, and electronic messages such as computer to computer data exchanges. These ways include cryptography—varied techniques for putting the messages into secret form by code or cipher; the elements of the message—letters, electronic pulses, voice sounds—can be scrambled or replaced by other elements. The receiver, who must know the key or secret procedure used in encryption, then reverses the process to read the original message. . . .

ONE BILATERAL RELATIONSHIP

Part III

U.S.-Canadian Communications and Information Relationships as a Case Study*



16

CANADA is exceptional in being the first country to recognize the full range of connections among the various communications and information resources. It has also been among the first to see and study extensively the importance of these phenomena to its political and economic processes and to its cultural and legal thinking. It has been among the first to use the newest of these resources specifically to establish strong communications links with its remote areas, and more broadly, to stay in the forefront of the newest technological developments. In fact, it could be said that Canada is highly developed, despite geographic dispersal, *because* of modern communications.

The Canadian government sees communications and infor-

* Condensed from reports by the Program on Information Resources Policy, Harvard University, in 1979 and 1980. Copyright © 1979, 1980 by the President and Fellows of Harvard College. Printed by permission.[1]

COMMUNICATIONS AND INFORMATION RESOURCES IN A GEOPOLITICAL CONTEXT

Part IV

U.S.-Advanced Country Communications and Information Relationships

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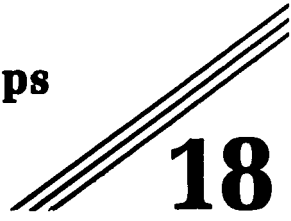
THERE are constant interactions between the United States and the other advanced countries which continuously involve the entire spectrum of communications and information resources. For the most part, therefore, these relationships are simply taken for granted. The older communications and information resources have always been the means by which the advanced countries conducted their numerous affairs, and new resources have in general been quite painlessly assimilated.

The United States and other advanced nations are all now entering the information age, and they are entering it at a time of economic, social, and political uncertainty. The heightening energy crisis, the weakening and outmoding of post World War II institutional arrangements such as those resulting from the Bretton Woods Agreement, a changing economic structure, the ever-present threat of Soviet aggression, and

U.S.-Communist Country Communications and Information Relationships



18

SINCE the introduction of communism as the political system of the Union of Soviet Socialist Republics after World War I, the United States and the Soviet Union have been active adversaries except for a short interlude when they made common cause during World War II. The animosity between the two countries and systems of government is deeply rooted and has dominated U.S. foreign policy and presidential politics for the past thirty-five years. What the United States does is also of the highest concern to the Soviet Union. And since the United States and the USSR are the only two superpowers, their bilateral relationships are of the greatest worldwide concern and import.

Since World War II, efforts by the United States and its allies to contain communism to relatively confined areas of the world have included the waging of two wars, in Korea and in Vietnam.

U.S.-Developing Country Communications and Information Relationships

19

UNITED STATES and advanced country communications and information relationships are characterized by an abundance of communications and information resources on both sides and generally amiable relations concerning them. United States and communist country relationships are characterized by an equal abundance but a generally negative atmosphere. With the developing countries, these relationships are distinguished by extreme abundance on the U.S. side, extreme scarcity on the other side, and a rapidly rising series of demands for participation in the information age on the part of third world nations.

On an economic basis, the developing countries can be divided into roughly three groups: the so-called "poorest of the poor"; a second group, somewhat better off but still very poor; and a third group, known as the "middle tier" countries, which is on the verge of leaving the developing world and becoming industrialized.

EIGHTEEN POINTS FOR FORMULATING POLICY

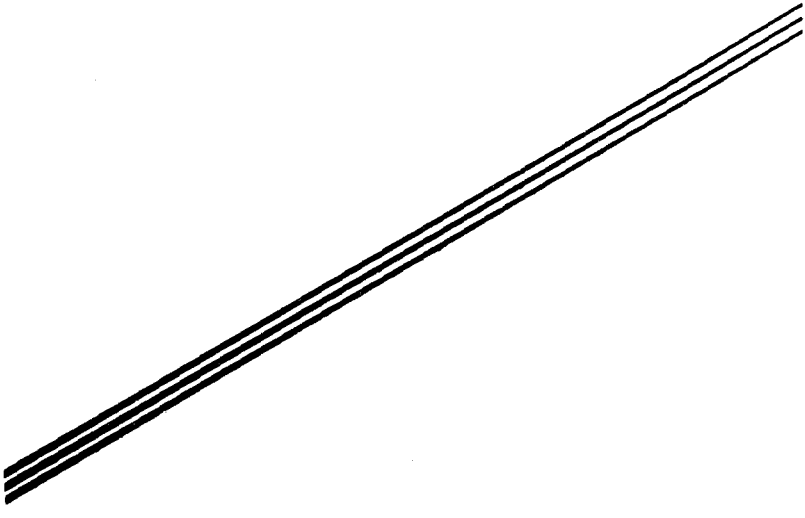
Part V

The International Policy Environment of Communications and Information Resources

20

ALTHOUGH it has been necessary in this book to single out the communications and information resources sector from others to understand its changing dynamics, this sector cannot and must not be treated in isolation. Communications and information activities are integral parts of and both conform to and influence U.S. domestic and international affairs. The general and then the more specific implications of communications and information for U.S. policy therefore need to be examined.

A prime concern of the United States is to maintain the military and economic security of its own nation and that of the free world. Communications and information must therefore work in harness with this objective, and with policies directed toward this end. The United States wants to maintain the free flow of information and free access to news by correspondents and the news media. It also has a major interest



APPENDIX

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an address to the Workshop on Strategic Implications of the Changing Telecommunications Environment of Newspapers, Harvard University, Program on Information Resources Policy, November 11, 1980.

1.6 André Giraud, Minister of Industry, France, opening address to the High Level Conference of the OECD on Information, Computer and Communications Policy in the 1980s, Paris, October 6, 1980.

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2.3 Charles P. Lecht, *supra* note 1.2.

2.4 Ibid.; Edward W. Scott, *supra* note 1.2; Peter J. Schuyten, "A Desktop Computer by I.B.M.: Giants Converge on Tiny Market," *New York Times,* February 6, 1980.

2.5 "The Uneven Impact of Price Increases," *Business Week,* February 11, 1980, p. 32; Charles P. Lecht, *supra* note 1.2.

2.6 Oswald H. Ganley, *Transborder Data Flow—A Significant Factor in World Trade?,* paper presented at conference on Transnational Data Flows, Washington, D.C., 1979.

2.7 John Bardeen, Walter H. Brattain, and William Shockley shared the 1956 Nobel Prize for physics.

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2.14 Ibid.

3 Dynamics within the U.S. Communications and Information Resources Sector

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3.3 Anthony G. Oettinger, "Information Resources: Knowledge and Power in the 21st Century," *Science,* Vol. 209, July 4, 1980, pp. 191–198. "The digital technologies underlying such devices are a merger of computer and communications technologies into a common stream that I have called compunications technologies" (p. 191); Simon Nora and Alain Minc, *The Computerization of Society: A Report to the President of France,* MIT Press, Cambridge, 1980.

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the controversial and cooperative issues found to exist between the two countries were considered to be in no way exceptional to those now present or which can be expected to crop up soon between the United States and other nations. Some details of that relationship are therefore included here as a guide to what can be expected to develop elsewhere around the world in the course of the coming few years; Oswald H. Ganley, *supra* note 7.6; Oswald H. Ganley, *supra* note 9.7.

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Acronyms

ABM	Antiballistic Missile
CCITT	Consultative Committee for International Telephone and Telegraph of the International Telecommunication Union (ITU)
C^3I	Command, Control, Communications, and Intelligence
CIA	Central Intelligence Agency
COCOM	Coordinating Committee
COE	Council of Europe
COMINT	Communications Intelligence
COMSEC	Communications Security
CRTC	Canadian Radio-television and Telecommunications Commission
CSCE	Conference on Security and Co-operation in Europe
DBS-TV	Direct Broadcast Satellite Television; also Direct Broadcasting by Satellite Television
DES	Data Encryption Standard
EC	European Community (sometimes European Economic Community)

ELINT	Electronic Intelligence
ESA	European Space Agency
FCC	Federal Communications Commission
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GNP	Gross National Product
HF	High Frequency
IBI	Intergovernmental Bureau for Informatics
IIF	International Information Flow
INMARSAT	International Maritime Satellite organization
INTELSAT	International Telecommunications Satellite program
ITU	International Telecommunication Union (UN)
MARISAT	Marine Satellite (a global maritime communications system)
MTN	Multilateral Trade Negotiations
NASA	National Aeronautics and Space Administration
NCA	National Command Authority
NIEO	New International Economic Order
NIIO	New International Information Order
NSA	National Security Agency
NSC	National Security Council (USA)
NTIA	National Telecommunications and Information Administration
NWIO	New World Information Order
OECD	Organization for Economic Cooperation and Development
OPEC	Organization of Petroleum Exporting Countries
PSTN	Public Switched Telephone Network
PTT	Post, Telephone, and Telegraph Administrations; Post and Telecommunications Authorities; Posts, Telecommunications, and Telephones
SALT	Strategic Arms Limitation Talks
SBS	Satellite Business Systems is the consortium of COMSAT, IBM, and Aetna
SIGINT	Signal Intelligence

SPADE	Single Channel Per Carrier Pulse-Code Modulation-Accesses-Demand-Assigned Equipment (SCPC/SPADE)
TBDF	Transborder Data Flow
TDF	Transborder Data Flow
U-2	American intelligence-gathering plane
UK	United Kingdom
UNCSTD	United Nations Conference on Science and Technology for Development
UNESCO	United Nations Educational, Scientific and Cultural Organization
V-2	First guided missile, developed by Wernher von Braun in Baden-Wurttemberg, West Germany, during World War II
WARC	World Administrative Radio Conference

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