Competition, Cooperation, and Discord in Information Technology Trade

Morris H. Crawford

Program on Information Resources Policy

Harvard University

Center for Information Policy Research

Cambridge, Massachusetts

A publication of the Program on Information Resources Policy

COMPETITION, COOPERATION, AND DISCORD IN INFORMATION TECHNOLOGY TRADE
Morris H. Crawford
November 1982, P-82-10

Project Director: Oswald H. Ganley

The Program on Information Resources Policy is jointly sponsored by Harvard University and the Center for Information Policy Research.

Printing 5 4 3 2

May 1985

PROGRAM ON INFORMATION RESOURCES POLICY

Harvard University — **Center for Information Policy Research**

Contributors

Action for Children's Television
American District Telegraph Co.
American Management Systems, Inc.
American Telephone & Telegraph Co.
Arthur D. Little, Inc.
Auerbach Publishers Inc.
Automated Marketing Systems
BellSouth Corporation
Bell Atlantic
Booz-Allen Hamilton
Canada Post
Cellular One
Commission on European Communities (Belgium)
Communications Workers of America
Computer & Communications Industry Assoc.
COMSAT
Continental Cablevision, Inc.
Copley Newspapers
Cowles Media Co.
Dai-Ichi Kangyo Bank, Ltd. (Japan)
Dialog Information Services, Inc.
Digital Equipment Corp.
Direction Generale
  des Telecommunications (France)
Doubleday, Inc.
Dow Jones & Co., Inc.
Dun & Bradstreet
Economics and Technology, Inc.
EIC/Intelligence Inc.
LM Ericsson (Sweden)
Federal Reserve Bank of Boston
France Telecom (France)
Gannett Co., Inc.
General Motors Corp.
General Telephone & Electronics
GTE Sprint Communications Corp.
Hitachi Research Institute (Japan)
Honeywell, Inc.
Hughes Communication Services, Inc.
E.F. Hutton and Co., Inc.
IBM Corp.
Information Gatekeepers, Inc.
International Data Corp.
International Resource Development, Inc.
Invoco AB Gunnar Bergvall (Sweden)
Knowledge Industry Publications, Inc.
Kokusai Denshin Denwa Co., Ltd. (Japan)
Lee Enterprises, Inc.
John and Mary R. Markle Foundation
MCI Telecommunications, Inc.
McKinsey & Co., Inc.
Mead Data Central
MITRE Corp.
Motorola, Inc.
National Association of Letter Carriers
National Telephone Cooperative Assoc.
The New York Times Co.
NEC Corp. (Japan)
Nippon Telegraph & Telephone Public
  Corp. (Japan)
Northern Telecom Ltd. (Canada)
Northrop Corp.
NYNEX
The Overseas Telecommunications
  Commission (Australia)
Pacific Telesis Group
Pitney Bowes, Inc.
Public Agenda Foundation
RCA Corporation
Reader's Digest Association, Inc.
Research Institute of Telecommunications
  and Economics (Japan)
Royal Bank of Canada (Canada)
Salomon Brothers
Satellite Business Systems
Scaife Family Charitable Trusts
Seiden & de Cuevas, Inc.
Southern New England Telephone
State of Minnesota Funding
Telecom Futures, Inc.
Telecommunications Research
  Action Center (TRAC)
Telecom Plus International, Inc.
Times Mirror Co.
Times Publishing Co.
TRW Inc.
United States Government:
  Central Intelligence Agency
  Department of Commerce:
    National Oceanographic and
      Atmospheric Administration
    National Telecommunications and
      Information Administration
  Department of State
    Office of Communications
  Federal Communications Commission
  Federal Emergency Management Agency
  Internal Revenue Service
  National Aeronautics and Space Admin.
  National Security Agency
  U.S. Army:
    Office of the Assistant Chief of
      Staff for Information Management
  United States Information Agency
  United States Postal Rate Commission
  United States Postal Service
US West
United Telecommunications, Inc.
The Washington Post Co.
Wolters Samsom Group (Holland)

Acknowledgments

In writing this study I have borrowed freely from my colleagues and associates in the communication advisory and task force units in the United States and in the computer-communication policy groups in the Organization for Economic Cooperation and Development (OECD) in Paris. I am indebted to these men and women for sharing their insights and expert knowledge, as well as their hopes and anxieties, about the future prospects of international trade in high technology communication systems.

Special thanks are due to the following persons who reviewed and commented critically on drafts of this report. These persons and the Program's affiliates 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.

Willis C. Armstrong

Keith J. Bane

Derek Davies

Donald V. Earnshaw

Glenn English

Penelope Hartland Thunberg

Kenneth W. Leeson

David F. Linowes

D. Verne Morland

Sean McCarthy

Dante Piccone

Teresita C. Schaffer

Timothy Stone

Raymond Vernon

Table of Contents

EXECUTIVE SUMMARY

Morris H. Crawford "Competition, Cooperation, and Discord in Information Technology Trade"

— International competition in information technology trade is becoming tougher, demands for controls more pressing, and devotion to cooperation increasingly strained.

— Expectations for the American companies in this trade hinge on how the companies and the U.S. government deal with trade competition and regulatory demands. The world trade is probably no less than $80 to 100 billion and rising at 10 to 15 percent yearly; the political stakes are equally important.

— The predominant American corporate strategy has been to set a fast technological pace to achieve a competitive edge. This strategy has been highly dynamic, going far beyond its hardware origins into major international marketing and use of software, management systems, data communications, videotex programming, and other services that are integrated into traditional industries. But this strategy has exhibited signs of lessening impact in recent years, leading some skeptics to question the future performance of American companies.

— At the same time foreign competitors have been gaining commercial strength. Efficient adaptations of U.S.-originated innovations frequently enable competitors to equal or better American producers in the marketplace. Concerted efforts are almost certain in the next decade to attain greater technological independence. Some Japanese corporations have already made progress toward that technological target.

— To further the competitive and technological objectives of their corporations, several OECD governments have tightened controls on information technology trade and have advocated broad international regulatory arrangements for the trade. The newly inspired domestic and international controls pertain primarily, though not exclusively, to the service side of the trade. Faltering economic conditions have intensified their appeal. The U.S. has proposed that GATT undertake negotiation of liberalizing codes on trade in services. Other GATT members have been lukewarm to the idea.

— The growing competition and the rising discord present several new policy challenges to American companies, to the U.S. government, and to the general public:

(1) Preparing for and reaching a consensus with other nations in GATT negotiations on information and communication service trade;
(2) Defining political priorities on controls the U.S. wishes to employ on technological information and assessing these against the economic and political costs of controls that other nations want to erect or retain over information technology trade;
(3) Improving industrial performance and productivity to meet the rapidly rising production competence of foreign producers;

(4) Developing corporate strategies that are applicable to a maturing cycle of information technology trade;
(5) Retaining the technological vitality that has given American corporations a competitive edge in the information technology trade;
(6) Developing an industry-government relationship in research and development that is less adversarial and will provide the basic research essential for commercial technology applications;
(7) Formulating an affirmative policy toward the Third World's expressed ambitions in information technology trade, a policy that can be implemented primarily through market processes;
(8) Determining the extent to which U.S. leadership should be given in establishing a global framework for issues of the information age.

Introduction

International trade in information technology goods and services is becoming increasingly competitive, and the rules that govern it increasingly contentious. The trade has been profitable for American companies responsible for most of the initiatives in these new areas of international commerce. Competitors in other industrialized countries, attracted by the earnings and the rapidly growing demand for goods and services, have strived to match and challenge the American companies; potential competitors in the Third World are getting ready to enter the contest.

An inevitable consequence of the spreading involvement in information technology has been mounting agitation for changing rules, for revising old or drawing up new legal and institutional arrangements for conducting the trade. Most of the agitation comes from outside the United States. In some countries governments have taken unilateral action. Many have proposed sweeping multilateral changes. Such action could take many forms, from procedural modifications to assure human rights to a politicized drive for a "new world information order"; proposals have ranged from specific regulatory measures to a comprehensive legal structure that could significantly alter the distribution of the trade.

This study is a recapitulation of the growth and development of the commercial competition between the United States and its principal competitors in the industrialized world. It is an analysis of the traditionally cooperative bargaining in the Organization for Economic Cooperation and Development (OECD) about the conditions of trade.

In Part One I have described the past technological and managerial strategy of U.S. producers, as well as the parameters of effective corporate strategy in the current phase of the industry. In Part Two I have summarized the competitive strategies of foreign producers in three principal information technology markets, (a) computers and computer services, (b) satellite communications and services, and (c) data communications and data networking services. In Part Three I have reviewed the international contention that has developed between the U.S. and its principal competitors over rules and regulations applicable to trade in the fourth principal market, information management and services. In Part Four I have raised questions pertaining to the future of the trade, focussing especially on the evolution of policy in the U.S.

My hope is that this study will add to public understanding of a complex set of commercial disputes that have disturbing political overtones. In this way the study may spur movement from today's contention toward cooperation and compromise in defining technical and commercial rules that are fair, progressive, and equitable to all of the international competitors.

I. The Foundations of American Competitive Strength

The American information technology industry inherited rich resources of knowledge and experience from technology intensive space and defense programs. Whatever the American companies owed technologically to federal research and development, their commercial success reflected a prolonged display of entrepreneurial ingenuity of their own making.

The fortuitous combination of government and private forces resulted by the 1960s in a high technology industry with extremely favorable potentialities for export earnings. (See Appendix A., p. 73, for a note defining "information technology industry.") U.S. producers had a comparative advantage for international trade and investment resting on (1) a significant technological lead in new product areas where declining costs and very elastic demand conditions prevailed, (2) a decided costing advantage over foreign competitors, and (3) a headstart in producing a range of new industrial products and services in which the value added by highly skilled individuals was very great. Earnings from information technology exports increased at high rates, rising from about $4 billion in 1965 to $30-35 billion in 1980. (See Appendix B, p. 75, for a note on statistical collections.) The new industry provided a prototype for the technology intensive trades, and it has yielded exceptional export earnings and high paying employment opportunities for many years.

A. Technology-Centered Management

The American companies from the first have been seeking ways to prolong their initial advantages. With all of its attractions the information technology industry was a tempting commercial target. Multi-

nationals elsewhere also sensed the same incentives for exploiting the technology. Support programs, technological osmosis, and skillful managerial strategies produced respectable competition abroad. Confronted by rivals abroad as well as at home, the American enterprises had to find an effective planning response or see their earning and market positions erode. Their answer was a strategy of unrelenting advancing technology frontiers. With a steady stream of product and production innovations and cost-cutting improvements, the American companies have tried to keep the competition off-balance and maintain a technological gap between themselves and their competitors. Employing technological advance as a central part of company planning was a managerial innovation of enormous importance; its successful implementation by American information technology companies consolidated and strengthened their competitive positions.

New and improved products and services came out of the American companies at a rate that has been unsettling to much of their foreign competition. When these goods and services were introduced abroad the American companies gained and held dominant positions in international markets such as:

- Large- and medium-sized computers.
- Remote data processing.
- Photographic and facsimile transmission equipment and services.
- Very large-scale integrated circuits.
- Satellite communication systems.
- Remote sensing and resource data collection.
- International data communication networks.

B. Innovations in Information Technology Applications

Managerial innovations have evolved in ever broader fields of application. The competitive strength of American corporations in information technology trade has not been limited to breakthroughs and innovations in computers and telecommunication technologies. Some of the most consequential innovations have been in applying computers and telecommunications to specific functions in traditional industries. These have been particularly important in management systems and in restructuring production and service processes. The convergence of modern information technologies with traditional industrial and service technologies and with traditional corporate management techniques has been an important factor in U.S. industry for several years, a phenomenon that has been regularly transferred abroad through the operations of multinational companies.

Three examples of international cross-industrial convergence are:

— The worldwide credit card computer-communication systems, such as VISA and American Express have established. The VISA system is built around its Base I network with two principal computer centers in the United States and dependent authorization centers in foreign countries. The system is linked through leased telecommunication lines. Authorization centers in the Base I network are located in Canada, several countries in Europe, and in Latin America. The transactions portion of the VISA system, its Base II network, is designed to transmit records of transactions from merchant-member processing centers abroad to the VISA-card-issuing member bank in the U.S. The Base II network uses two computers in U.S. centers to communicate with members through leased lines.[1]

— The integrated information systems that many corporations are employing for corporate decision-making. Among the U.S. corporations using

such systems are IBM, EXXON, General Motors, Citibank, Motorola, and Johnson & Johnson. Typical is that of an American transport manufacturer, one of the fifty largest industrial companies in the U.S. This company operates in 185 countries outside the U.S., with major production and distribution centers in Europe, Canada, South America, and Asia. Its corporate headquarters has eight large computers that are employed as central processing facilities for domestic operations, as well as for international operations. Several subsidiary data centers have been set up outside the U.S.; these subsidiary centers have some autonomy for performing local processing on personnel and customer accounts. The main computer center serves principal corporate requirements related to (1) consolidated financial accounts and statements, (2) worldwide market reports and analysis, (3) centralized engineering planning, (4) inventory control, parts acquisitions, production scheduling, and shipping and logistics, and (5) credit and customer accounting.[2]

— The remote computing service bureaus that offer data processing and other data base services to U.S. and foreign corporate customers. Typical American companies offering such services are Computer Science Corporation, Control Data Corporation, General Electric Information Services, and Tymshare. The service bureaus of these companies operate through networks of their own, built on private leased lines or interconnections with public data networks, or a combination of the two. Services marketed by General Electric through its Mark II computer communication system include data processing for (1) international financial consolidation and corporate financial planning, (2) sales and order processing, production control, and inventory management, (3) proprietary data base services (e.g., for marine charters or currency

exchanges), and (4) common computer programs (e.g., data and library information on civil engineering, contract tenders, engineering design, numerical control programs for automated machine tools).[3]

These international innovations are an important part of the American-led technological revolution and of a new world that Daniel Bell calls the "Post-Industrial Society" that is "tied together in real time."[4] American corporate strategy has been instrumental in creating this new world, and has produced impressive commercial results for itself. The strategy has been acclaimed as a competitive approach that should be followed throughout the economy. But the strategy has also provoked international reverberations, intense competition for markets in information goods and services and growing contention over the legal and regulatory conditions under which the trade is conducted. Vulnerabilities have developed that have opened windows for competitors. Success has created a backlash by giving competitors a better chance. Let us review, before turning to the competitors and the backlash, what some American critics have to say about U.S. vulnerabilities and successes.

C. The Vulnerabilities of a Technology-Driven Strategy

A growing number of American observers are convinced that corporate strategists should pay more attention to Alice's Law of Treadmill Economics -- you have to run faster and faster in order to stand still. U.S. slippage, it is said, has permitted Japan and others to narrow and in some cases overtake the U.S. commercial lead. The seeming loss in effectiveness of the technology-driven strategy has been the subject of much speculation and factual examination. Some writers interpret what they see as the normal evolution of a new industrial effort. Others draw pessimistic

conclusions and call for a resurgence of corporate vitality, or at least a correction of bad habits in government and business.

One group has been looking inward at U.S. domestic behavior, and suggesting, as Lester Thurow has done, that "the enemy is us."[5] Thurow has been especially aroused over management's failure to integrate technological change with corporate policy and international competitiveness. The failure, he says, is a major reason why the "United States has been defeated economically" and has become "one among many." This is an inevitable result, he has said, of the decline in productivity caused by insufficient savings for intensive capitalization in high technologies and by insufficient resources for education and training.[6] Thurow's harsh judgment places stress on labor policies that should, but do not, assure worker satisfaction and acceptance of technological change. Without a contented labor force, he says, technological competitiveness is sterile.

Gene Bylinsky in Fortune Magazine has supplied evidence for some of Thurow's speculations. This is why, the Fortune article states, the American semiconductor industry "has lost the struggle for dominance in the 64 K bit market."[7] Job instability, excessive labor mobility, and a lack of worker dedication in Silicon Valley, their research indicates, have enabled Japanese companies to beat the Americans on higher quality chips.

William Ouchi has also indicted American management for its inadequacies in relating work forces to technology strategy. He claims that the management organizations most prone to this failure have been predominant in the U.S.[8] Ouchi believes that information technology companies like Hewlett-Packard and INTEL have shown that worker satisfaction in the shop is compatible with high technology, and in fact can reinforce a technology-driven strategy.

Hayes and Abernathy attribute the decline in U.S. international competitiveness in large measure to American companies turning away from innovator strategies.[9] Too many corporations, they assert, opt for financial solutions and gauge corporate prospects by financial accounting standards alone. By overemphasizing short-term cost reductions, corporations tend to neglect long-term technological competitiveness and fail to maintain technological sharpness either in the marketplace or on the production line. In most industries, they conclude, success "requires an organizational commitment to compete on technological grounds."[10]

A second set of investigators of the technology strategy has been looking outward at the effect of the strategy in diffusing technology. The econometric analyses of Edwin Mansfield have shown that international technology transfer has spread with increasing rapidity in recent years.[11] Licensing technology through joint enterprises or merger agreements, or through the simple sale of know-how and management contracts, have been important channels for accelerated technology diffusion. Another major channel, Mansfield believes, is the foreign subsidiary of the U.S. multinational firm, which performs a significant part of the research and development for many multinationals. Many foreign firms, Mansfield concludes, are able to devote large amounts of R&D funds to adapting, modifying, and improving American technology, rather than developing their own.[12]

Mansfield's studies suggest that producers in other countries may be getting a free ride on U.S. technological advances. Harry G. Johnson agrees and has contended that the ease with which advance technology is transmitted to foreign competitors has resulted in a shift of comparative advantage away from the U.S.[13] Jack Baranson has also concluded that

multinational firms are contributing to the deterioration of the American competitive position by transferring too freely to subsidiaries or licensing excessively to foreign corporations.[14] He has suggested that it might be judicious to adopt preventive controls or fiscal measures to discourage movements of U.S. technology assets abroad. Trade unionists have also advocated restricting the outflow of technology in order to slow down the diffusion process and thereby preserve jobs and income in the U.S.[15]

Mansfield himself questions these proposed remedies largely because of the effect that restricting technology export would have in reducing or enervating research and development activity in the U.S.[16] The Department of Labor has finessed the proposals with its independent finding that "technology transfers from the U.S. make only a small contribution to foreign production capabilities."[17] The strongest dissent comes from the Computer and Business Equipment Manufacturers Association (CBEMA) on the ground that controls imposed to gain commercial advantage would have the opposite effect and would, in fact, provide opportunities for competitors at the cost of U.S. jobs and reduce the capability of U.S. industry to compete in world markets.[18]

Penelope Hartland-Thunberg and I have come to similar conclusions in our investigation of the relationship between export competitiveness and national policy on export finance and research and development.[19] U.S. export competitiveness has been strongest in the post-war period, we have reasoned, in those areas of greatest technological lead. Technological advances generated by the world's leading research and development institutions have been the base of U.S. comparative advantage in world trade. U.S. policies aimed at sustaining or speeding up technological

advance make more sense, we have concluded, than policy measures aimed at slowing down or hampering technological advantages of others. Such policies could be accomplished with a firm commitment to commercially competitive R&D and export finance that would contribute to the maximization of U.S. national production. High technology industries like aerospace, telecommunications and electronics are the U.S.'s most efficient, with manpower productivity 40 percent higher than the national industrial average. Their export, especially when supported by successive generations of new products and production improvements, add more to the nation's production total than other uses of resources. Optimal use of the nation's resources "should emphasize productivity and be an export oriented program."[20]

These critical assessments tend to support the desirability of a technological orientation in corporate management. Indeed, Alan L. Frohman has concluded in the Harvard Business Review that "no one doubts anymore that to be more competitive with foreign companies U.S. manufacturers need to increase their investment in R&D."[21]

A third speculation about the strategy of American corporations asks, "What happens when the sources of fundamental knowledge dry up?" How long can corporate technology strategy work when federal support of research and development of basic knowledge is faltering? In the Vietnam war years, funding for fundamental R&D was drastically curtailed. Appropriations for information technology were cut along with other R&D. Defense programs whose antecedents had provided building blocks for the information technology industry were reduced or eliminated. The NASA space exploration and research programs fell off from earlier years when they were a prolific source of advances in basic knowledge in electronics and communications.

Corporate outlays on R&D have increased 50 percent in real terms, but they barely compensate for the decline in federal R&D spending. Total 1982 national funding in real terms is about the level of 1967.[22] The American Association for the Advancement of Science has weighed these conflicting trends for falling federal and rising corporate expenditures against the increasing requirements of a much larger economy. Their conclusion is a cautious warning, "The significant issue for the United States may well be not the trends in the statistical totals, but whether adequate R&D efforts are in fact being mounted by industry in areas where significant economic and social benefits can be expected."[23]

The full effects of dwindling basic research may not be felt for many years. The 1980 "Report of the President on U.S. Competitiveness" contained a mild warning that less technological effort "may mean increased competition for U.S. firms."[24] Several writers have collected evidence showing that the post-Vietnam deemphasis on R&D in fundamental electro-technologies has already been felt. F. Fred Bucy has pointed out that the spin-off effect from defense research and development has reversed direction, as the defense agencies now look to the private sector for military applications and provide little fundamental knowledge in return.[25] In comparing Japan's Ministry of International Trade and Industry (MITI) with the Pentagon's fundamental research and development in six criticial technologies, Robert Reich concludes, "Japan is likely to surpass America within the decade."[26] Secretary of Commerce Malcolm Baldrige has warned about Japanese producers who are "taking dead aim on U.S. technological leadership."[27]

Some analysts believe that hyped up defense budgets and the resulting "glut of money for R&D" will reserve the decade-long trend.[28] Indeed, R&D

for defense in the 1983 budget is $25 billion, up $8 billion over 1981 and higher by 23 percent even after correcting for inflation.[29] The rise in defense R&D is largely at the expense of federal support for other areas (health, energy, and general science) and overall federal support in the 1983 budget is a bare 2 percent above the 1981 level.[30] A large portion of the defense effort, however, will be expended in support of a military strategy that emphasizes advanced weapons systems. A major priority, says Under Secretary Richard D. DeLauer, will be given to command, control, communications, and intelligence systems.[31]

These changes in federal budgeting suggest the possibility of a revival of federal programs supportive of information technology advance. But it is far from clear that a reversal of the past decade is taking place. NASA continues to function on spare rations and has had to give up several important programs.[32] Research on computer applications in health and energy has been severely cut. Moreover, the American Association for the Advancement of Science has cautioned that the defense R&D budget faces many issues and problems.[33] Among these are (a) uncertainty about advanced weapons systems retaining their current high priority, (b) questionable prospects for several key weapons systems that loom large in R&D plans, and (c) uncertainty that defense outlays will continue to attract their 1983 political priority. Until some of these uncertainties about the national defense are cleared up, doubts will continue about federal support.

D. Problems and Consequences of Worldwide Usage of Information Technology

While Americans ponder their technological and competitive superiority and how to extend it, others view U.S. corporate successes and the impact of the growing usage of information technologies differently. "As a

result," the United Nations Center on Transnational Corporations has concluded, "transnational corporations have improved their capacities to manage and coordinate more efficiently their global operations." This, the Center reports, "may thus lead to an accentuation of existing imbalances of political, economic, and social advantages."[34] The French Minister of Industry has similarly described the imbalance in computer technology as "hegemony in the cultural and economic fields."[35] The Vice Chairman of Canada's Radio-Television and Telecommunications Corporation has suggested that for any nation an adverse international imbalance in information technology should be regarded "as the best way to fall behind; as a mark of underdevelopment."[36]

In the following pages I have presented an historical record of how information technology trade has evolved and how its evolution has been dealt with in corporate competition and international affairs. I have focused on the relevance of existing domestic and international rules and regulations to competition in these new areas of trade. What is at stake in the international contention is corporate market shares, corporate position in international industries, and high and growing levels of trade that affect national prosperity. National prestige, sovereignty, security, and cultural values are also involved, adding these sensitive dimensions to legal and regulatory issues that are exceedingly complicated in their simplest forms.

II. Responding to the American Lead in Information Technology

The formidable position enjoyed by U.S. companies because of their superiority in computer and communications technology and their innovative lead in applications in traditional industries has posed a frustrating challenge to others wanting to compete in information technology trade. In the quasi-open marketing style of international trade in the post-World War II period, Japan, Canada, and the European nations have generally followed liberal policies toward information technology trade. Their desire for access to American technology and for having the most efficient products and services for domestic uses has been a compelling motive for limiting entry controls. Open marketing, nevertheless, has been tempered by import duties, trade restrictions, narrow technical standards, investment regulations, and other forms of non-tariff controls. Protection of domestic producers has motivated many of the trade barriers, and other political and social aims have reinforced protective inclinations. The policy tensions in balancing between these conflicting corporate objectives -- coping with the American competitive lead while exploiting the commercial potentialities of the technological advances -- may be seen in three areas of information technology trade, in computers, in satellite communications, and in data communications.

A. The Origins of Competition in Computer Trade

Treatment accorded American companies in Europe and Japan has corresponded closely to the phase of development of homegrown competition. Open trade and investment in information technology has been the rule, qualified by two considerations: (1) that it should not interfere with,

and preferably should support, advancement of domestic capabilities, and (2) that it should not damage or displace existing domestic industries. European and Japanese policymakers have functioned under important restraints, for their producers needed American equipment and software, because of its technical superiority, to meet growing data processing requirements, and they needed access to U.S. technology in order to build their own.

While pioneering work in the development of computers had been done in Europe, the opening of the commercial computer and data processing industry in the 1960s was virtually an American show.[1] A genuine multinational industry grew up in Europe and Canada, centered around the American companies and their foreign affiliates, an industry in which IBM was for many years the dominant figure. Sale and rentals of equipment of U.S. manufacturers required local distribution and service affiliates, which soon took on additional manufacturing functions. Many of the early American computer manufacturers were producers of office and business equipment and had been manufacturing in Canada, Japan, and Western Europe for many years.[2] IBM, Burroughs, and Sperry-Univac could trace their production and sales experience back to the 1920s or earlier. These facilities became the production units for the growing computer trade.

The multinational character of the American manufacturers was evident in the activities of their European units. While maintaining central corporate control, the American companies gave subsidiaries in Europe and Canada specialized functions -- producing specific components, memory systems, or peripherals — that were coordinated in a corporate-wide system. The companies were carrying out an international division of labor as the most efficient form of manufacture. Production units were assigned

production responsibilities that could be carried out on a scale of efficiency. European production often served as the source of supply for corporate orders throughout Europe and in other parts of the globe.

This pattern of production and supply of the American companies was also the consequence of the policy environment in which they functioned. The pattern evolved under significant pressures on the Americans to build and maintain production as well as service facilities where their companies were selling. The government contract was an important instrument of pressure, for official bodies were large buyers. They were frequently the principal customers of computer installations. France's Seventh Plan stated candidly that, in dealing with data processing expenditures, "foreign competitors must be denied access to government contracts unless they give compensation in their own markets."[3]

At the same time national companies were trying to establish viable operations. Compagnie Internationale pour l'Informatique (CII) in France, International Computers Ltd. (ICL) in the United Kingdom, Philips in the Netherlands, Fijitsu in Japan, and Siemens in Germany were major national companies receiving support.[4] The American companies were encouraged to establish ties with their competitors. For the Americans, corporate collaboration frequently appeared as economically advantageous. Collaboration often provided an opportunity to collect on licensing royalties in rapidly growing markets. It also offered a way to qualify on domestic origin requirements for government contracts. For the Europeans and Japanese the joint undertakings looked like a mechanism for technology transfer. In a few years' time this conjunction of cooperative means to achieve competing ends led to an enormous number of international

production arrangements, licensing agreements, and joint corporate ventures.

Few of the ventures survived intact in the long run. They were motivated primarily by expediency and have tended to evolve as off-again, on-again collaborations.[5] The joint corporate and licensing agreements of the late 1960s and early 1970s, nevertheless, played a significant role in raising the technological level of European and Japanese industry to competitive status with U.S. firms. Hiring former employees of U.S. transnational companies accentuated other technology transfer efforts of domestic companies. Transnational diffusion in the early years reinforced the less effective national research and development systems and the flawed efforts of governments to help national companies work up to competitive technological strength. Combined with other elements of policy, the association with American companies provided an indispensable means of achieving an internationally competitive computer industry in the major countries of Europe and Japan. Without the transnational diffusion the computer industries in Europe and Japan in these earlier years might have been at a standstill.

Policies were by no means constant, pursued unswervingly, or without reverses. By the 1970s several nations had pulled their research and development act together and were beginning to embark on "innovation support" programs that enabled them to bring their domestic companies to a respectable competitive showing in quasi-protected markets.[6] Today computer companies in Germany, the United Kingdom, France, and Japan have closed much of the distance that had separated them from the Americans only a decade earlier. A few domestic manufacturers have secured a place for themselves in their own national markets. ICL in the United Kingdom,

Siemens in Germany, Philips in the Benelux, Honeywell-Bull in France, and Olivetti in Italy have solid bases at home and are able to compete in export markets.[7] Progress has also been made toward the goal articulated in 1975 by the French Minister of Industry and Research: "National independence assumes both a mastery of certain techniques and an ability to conquer world markets. The one cannot do without the other. Nowadays, the possession of an advanced technology without the ability to compete on international markets is a false guarantee of independence."[8]

Yet for many European and Japanese computer companies, global competitive ability has been a qualified accomplishment. None have seriously challenged IBM as yet -- though none of the American companies have either -- or even seriously challenged its strongest product areas. A Datamation market survey for 1980 is revealing. It shows four European firms among the top five in marketing in Europe.[9] The other one, however, is IBM, whose total revenues in Europe are double those of the top four European companies. Like many in the U.S., the most successful are competing in specialized markets -- such as minicomputers or personal computers -- or are marketing IBM-compatible peripherals.

The greatest difficulty of entry into the global competitive system is being experienced by some of the European companies.[10] Overhead costs for global competition are a formidable obstacle. Markets have not materialized to warrant efficient, large-scale production and marketing techniques. Several are beginning to build up international production structures that might yield production economies for global marketing. But many have not yet acquired the marketing know-how for selling in unfamiliar territory.

Inability to agree on establishing a "European market," within which the most competitive European producers might emerge as strong contenders to the American, has been a conspicuous handicap.[11] A workable cartelization formula has not been developed, and efforts to combine national corporations into a multinational European organization have not borne fruit.

Currently, the Community is seeking to give practical effect to the Dublin Report of 1979. This commitment was approved by a heads-of-state conference in Ireland. It calls for members (a) to initiate measures to adapt the new technologies to use, (b) to establish a uniform EC market, and (c) to create new markets and strengthen European industrial capacity.[12] The new European strategy, described at length by Thomas J. Ramsey, is having difficulty with the formidable centrifugal forces that have handicapped all European efforts in the past.[13] Nevertheless, the Dublin Report strategy is the kind of commitment that has enabled the European Community to achieve important successes even when falling short of more ambitious "common market" targets.

A corporate approach that has worked for some Japanese and European firms in breaking into the American market is the mirror image of a pattern of a decade earlier. Acquiring specialized, smaller companies in the U.S., particularly those with marketing organizations and software competence, is another route for getting access to markets and an easy way to cater to American tastes. These arrangements frequently provide that the U.S. service company will market services compatible with the terminals or devices of the foreign collaborator, enabling the latter to gain a foothold in the U.S. market for hardware.

Japan's companies have benefitted from the chronically undervalued yen that is the result of "rigging of their capital markets."[14] Undervaluation has enabled Japanese producers to offer products at favorable prices, at the same time that it has forced U.S. and other producers to sell in Japan at disadvantageous yen prices. Mrs. Hartland-Thunberg, using purchasing power parity measurements, has estimated yen undervaluation at 10 to 25 percent during the past decade.[15] This is a margin great enough--even allowing for statistical imprecision—to overcome other advantages their competitors might have. Aggressive costcutting, noted in Siemens market analysis for 1980, aided the Japanese to capture a growing share of the European market for integrated circuits.[16] Yen undervaluation is one reason why in 1981 Japan exported $1 billion in calculators and photocopy machines to the U.S. while the U.S. companies could sell only $40 million of these products in Japan. It contributed to the decline in U.S. computer makers share of the Japanese market from 82 percent to less than 45 percent in less than a decade.[17]

The 33 percent decline in the yen-dollar rate over the last two years has accentuated the undervaluation and has been a bonanza for Japanese companies. Price quotations of Japanese exporters tend to be in dollars. Consequently, as the yen rate has dropped they have had additional yen earnings to improve their competitive positions, to cut dollar prices for higher market shares abroad, or to pile up profits at home.

Marketing in Third World countries has attracted both European and Japanese companies, particularly because these are softer markets where up-to-the-minute technology may not be demanded. The Third World export efforts have been encouraged by several governments. Japan, France, and Germany, for example, have established support bodies that commingle

assistance from official funds with commercial sales of computers and related information technology products and services. Mixed credits and co-financing of goods and services is a common practice of advanced nations--not including the United States. Low-cost financing is also provided by Japan and most European nations to promote export of computer products to developing countries.

B. Cooperation and Rivalry in Satellite Communications

Like the American innovations in computer technology, development and exploitation of satellite communications opened up a vast array of new trade areas that have grown rapidly -- in all of which U.S. suppliers have the inside track. Trade in satellite communications technology now includes sales of hardware, consisting not only of the booster systems but also of the design and equipment on the satellite itself and of the ground receiving and transmitting equipment. Satellite communication services trade is even more extensive and includes both rocket-launching services for putting customers' satellites into orbit as well as training wherever customers want to develop a ground service capability of their own for launching backup. A wide variety of communication services are traded internationally, ranging, aside from international telecommunications, from remote collection of earth resource data to direct television broadcasts from space. Markets for videotex and teletex hardware and services, as well as for programs and programming services, are expected to grow to a several billion dollar international trade in the next decade. Finally, satellite communication systems have opened up numerous trade markets in analytical and data bank services, particularly important when combined with computer and data storage facilities in data communication systems.

At the center of this vast new trade complex is the communication satellite in geocentric orbit pioneered by the International Telecommunications Satellite Organization (INTELSAT). The establishment of INTELSAT in 1964 provided other nations immediate access to satellite services and a modicum of operations control.[19] But INTELSAT also put difficult long range questions before Japan, Canada, and the Europeans. The organization was dominated by the U.S. in all respects. NASA supplied the launching, and American private suppliers supplied most of the equipment and technical expertise. Such dependency, even operating through an internationally controlled organization, had two trade consequences that would be hard to accept as a permanent affair: (1) a quasi-monopoly supplier position for the U.S., and (2) a reservation for U.S. producers of the earnings from highly profitable equipment and services trade. No one was in a position at that time to challenge the U.S. monopoly. Moreover, the outlook for eventual challenge was not bright. Private sector capabilities in space communications did not exist outside the U.S. The ultimate prospects and benefits from space communication systems were uncertain, and private sector development could not be expected to take place spontaneously. National governments were apprehensive about allocating resources for full entry into satellite communications and lacked experience in choosing among options for limited entry.

All of the principal nations in Europe as well as Japan were, nevertheless, trying to establish a national capability in space communications. In the early 1960s all of the principals set up space agencies that were expected to encourage private companies and build up public companies. The most persistent and best supported programs were

found in the public enterprises in the United Kingdom and France, both of which were also pressing for launching capability for military employment.

INTELSAT proved to be an effective means for foreign commercial enterprises to gain valuable experience as contractors in constructing communication satellites.[20] Primary contracting usually went to American companies, but production of components was parceled out to individual suppliers throughout the member countries. In time, these suppliers accounted for virtually all specific operational components of new satellite construction. This process of technology transfer by osmosis was an effective part of the satellite communication learning curve, possibly even more important than the direct efforts in national space programs. INTELSAT contracting in effect was building up an internationally competitive set of national production units in its contractual infrastructure for space communication production.

European efforts to collaborate on their own joint space programs had uneasy support and are generally regarded as far less satisfactory than INTELSAT. The European Space Vehicle Launcher Development Organization (ELDO) and the European Space Research Organization (ESRO) were formed in the 1960s in the expectation that joint action would assure Europe's future in the exploitation of space.[21]

But ELDO and ESRO began to encounter self-constructed roadblocks shortly after they were formed. The United Kingdom, which had originally proposed ELDO in a vain effort to salvage something from the militarily defunct "Blue Streak" rocket, balked at laying out additional money on launcher development. The U.K. wanted to concentrate on satellite applications and to devote funded resources to those purposes rather than to working on an alternative to the "Blue Streak." Other members were of

different minds. Germany was primarily interested because of the potential that telecommunications and electronics offered as an expanding export sector. The Germans were inclined to use U.S. launcher technology as the most cost effective route for the space efforts they considered of high priority. France had in mind an altogether different approach than either the U.K. or Germany. Wanting to compete across the board in space science, France proposed to build and maintain a European and French launch capability that would be independent of the United States.

In these divided circumstances, ELDO and ESRO had little chance of survival and even less of success. By 1973 the two organizations had been effectively deserted by their European principals. A new body, the European Space Agency (ESA) emerged in 1975 as an agency that enjoyed a more purposive consensus than its predecessors. The founding agreement described ESA as an organization established for "improving the worldwide competitiveness of European industry in space technology."[22] If ELDO and ESRO failed because their members could agree on nothing, ESA was formed to succeed by agreeing on everything. To achieve the consensus, ESA relied on trade-offs among the principal national interests. In the ESA program were included the pet projects of each of the major parties. France got its expensive Ariane launcher, Germany its space lab, and the United Kingdom the maritime satellite it had been pushing. Each agreed to finance a majority contribution to its pet project, in exchange for modest support for the projects of the other members and overall support for a telecommunications program.

The six years of ESA have been controversial. According to one critic, "each programmed element is a political football, with individual governments and national industries pursuing their own ends."[23] Although

major space development programs have been successfully carried out by ESA, the European governments in the organization have had great difficulty in agreeing on workable modes for commercial collaboration. Each of the major partners has reservations about ESA as a vehicle for commercial applications of space technology. As a result, all projects have heavy going. They generally find commercial realization outside ESA, in bilateral or other arrangements, and frequently as purely national undertakings.

Yet despite a disappointing record in some respects, ESA has measurably aided and advanced European space exploitation capabilities through the projects it has supported. Four French and German companies, MBB and AEG Telefunken in Germany and Aerospatiale and Thomson in France have formed a Euro-Satellite consortium to produce and market satellite technology products and instrumentation, and they expect to subcontract a number of specific projects to Swedish and Belgian firms.[24] Germany and France will launch a direct broadcast by satellite service in 1983. ESA satellites are to be employed by the Confederation of European Post and Telegraph (CEPT) organizations for European-wide telecommunications and by the European Broadcasting Union for television and radio links. An ESA space lab is scheduled to be launched aboard the U.S. space shuttle in 1983. The General Telephone and Electronics Corporation in the U.S. has contracted with Arianespace to launch two satellites in 1984 using advanced Ariane rockets developed by ESA.[25] ESA has developed remote sensing competence and can now offer expertise in this highly important resource development technology.

Yet national applications can hardly proceed in the confined geographical areas of Europe without considerable international impact.

The probability of conflict will be very great, for example, as European nations proceed with current plans for broadcast satellites in the next five years. A nasty battle may be brewing between Germany and Luxembourg over the latter's plan to build and operate a super satellite that would beam commercial television in the German language.[26] Although a proponent of do-it-yourself in ESA, Germany is taking a hard line on Luxembourg's do-it-yourself proposal.

Thus, the problems of noncooperation are as formidable as the frustrations of trying to work together. Searching for compromises that work appears to be a never ending issue for European space policy. European space capabilities have reached a respectable stage of commercial application through collaboration -- plus an important assist through technological osmosis in the INTELSAT arrangement. In spite of inadequacies, some form of European regional collaboration is likely to continue.

C. Data Communications: The Dilemma of the PTTS

A third area of mounting market competition has been in data communications. Data communications, like satellite services, has presented both private companies and government difficult questions of organizational authority. Indeed, all policy issues of the new information technology have come at governments from several angles, creating organizational conflict, particularly between old-line agencies and new entities, and leading to confusion more often than unified policy. The merging computer and telecommunications technologies have presented an especially cumbersome case. To effect the merger it has been necessary to bring together a pushy and unstructured group of newcomers with a staid and

conservative bureaucracy.[27] The problem has been magnified because the pushy newcomers have been outsiders from the United States.

The Post, Telephone, and Telegraph (PTT) organizations have run the public service monopolies in national communication systems for many decades in virtually all countries outside of North America. After years of relatively sheltered existence, these bureaucratic entities were confronted in the 1960s by an impending union with a partner with whom they had little in common — except for the one thing that mattered, converging technological bases. The prospective industrial merger looked like a mismatch to a prominent European PTT official, T. Larsson, who described the "Odd Couple" in the following way:[28]

— Telecommunications is a 100-year industry which has remained basically stable. Computing is an infant. But with phenomenal growth it is already a key industry.

— Telecommunications has an established scientific base. Computing is not yet accepted as "real" science.

— In telecommunications investment is related to an existing capital structure in a total network, while in computing it is possible to keep investments flexible and adaptable in modular form to meet the uncertain needs of future markets.

— Telecommunications is in the hands of a public monopoly and is planned to cope with vital national requirements. Computing is in the hands of private enterprise and there is no national planning despite its importance to society.

— Telecommunications is a public service in which social needs affect tariffs. Computing is the subject of keen competition for survival.

— In telecommunications, manufacturers mainly serve national interests. Computer manufacturers operate and market internationally.

— In telecommunications a high degree of international standardization has been agreed upon. Computer standards are set by manufacturers and influenced by competition rather than user needs.

Larsson's attitude is widely shared in the traditional communication industry in Europe and Japan. It is hardly surprising that conflict should arise between the PTTs and the American companies in the data processing and computer fields. In view of the many problems of the computer-telecommunications union, and uncertainty about how to meet them, the European PTTs and the Japanese as well have been very circumspect in responding to the aggressive marketing of Americans in setting up international computer networks. Private leased lines used by the Americans were initially made available as revenue earners for the PTTs without qualifying strings. But when the market for data communications began to grow rapidly, the PTT attitude toward leasing lines for private networks hardened.[29]

The PTTs could do little immediately in competing with the data communication operations of the Americans. Although private networks were booming in Europe and Japan (Logica identified sixty private lines and estimated that another forty were operating in Europe in 1977, and the Information Processing Development Center estimated that ninety-seven networks were operating in Japan), the public authorities could not improve their own service offerings for several years.[30] A Federal Cabinet study in Germany was commissioned in 1973 to recommend the requirements of the computer communication systems, but the first public data network did not begin domestic service until 1978.[31] The Nordic network in the Scandinavian countries and Transpac in France were not started until a year

later.[32] In Japan the Nippon Telegraph and Telephone (NTT) Public Corporation provided only low grade network service until 1978.[33]

One factor in initial PTT thinking was the pessimistic projection of the income they could expect from data transmission services. A report commissioned in 1971 by the CEPT administration projected payments on modems and lines amounting at most to 4-13 percent of the earnings of individual PTTs.[34] Despite other signs of increasing demand for data transmission facilities, the PTTs evidently were hesitant about investing in a relatively speculative area when their resources were stretched to meet the unquestionable demands of the general public for cheaper telephone service.[35]

D. Expanding Public Networks in Europe and Japan

The actual experience of the PTTs in the early 1970s suggested that the growth expectation of data communications was much larger than forecast in the CEPT report. According to the chairman of the EURODATA Foundation, Marino Benedetti, data transmissions grew twice as fast as the earlier projections.[36] The switching equipment installed was used so intensively that it was far more valuable to the PTT administrations than corresponding connections used for telephone service.

A new study commissioned in 1976 by EURODATA updated the earlier market forecasts and calculated detailed estimates of the equipment requirements and traffic projections to 1987. OECD began a study on international data networks at the same time. Together the two reports provided the factual foundation for a strong national and international expansion in European data communications.[37] The EURODATA projections showed that data communication terminals could be expected to grow fourfold

by 1986, and the number of terminals using PTT services could grow by sixfold. The total volume of data communication traffic would increase by about eight times, and a $2 billion earner in 1979 could become an $8-10 billion earner by 1987. The Logica study for OECD focussed on the operations of international networks and emphasized the expansion of international traffic in the 1980s projections. Both of the studies stressed the great importance to European business of data communication service and pointed to the necessity for the European PTTs to install much more sophisticated equipment if they were to serve the market satisfactorily.

The PTTs anticipated the general tenor of the two studies long before they were made public in 1979. By 1974, in fact, installation work had begun on national public data networks in twelve countries, and planning had been started on a European system. EURONET, the European-wide system, was backed jointly by CEPT members and the European Community. These interconnecting national and international systems, summarized in the table below, were planned as the basis of a European public network.

Table 1

European Public Data Networks

Country	Network	Date of Operation
Belgium	--	1979
Denmark[a]	Nordic Net	1978
Finland[a]	Nordic Net	1979
France	TRANSPAC	1978
Federal Republic of Germany	DATEX	1978
Italy	--	1978
Netherlands	--	1979
Norway[a]	Nordic Net	1979
Spain	RETD	1971
Sweden[a]	Nordic Net	1978
Switzerland	EDW	1978
United Kingdom	Experimental Packet Switching Service (EPSS)	1977
CEPT-EEC	EURONET	1978

Source: Logica, "The Usage of International Data Networks in Europe," OECD, 1979.

[a]The four Scandinavian PTTs have combined in developing a joint network, though each of the national portions is separately operated and managed.

Most of the national public systems were ready to begin service by 1978. Since then they have been upgraded and service extended into new communities. The systems have been designed in accordance with the international standards of the Consultative Committee for International Telephone and Telegraph (CCITT) of the International Telecommunications Union (ITU). Thus, they offer the ability to interconnect equipment of manufacturers that have followed CCITT standards.[38] When they are fully interconnected with EURONET, the combination will provide a European-wide public data network.

An important aspect of the development of the public data network in Europe has been the expectation of the PTTs that national networks would operate as public utilities, just like the telecommunication systems. In associating the new service with the public utility concept, the PTTs seemed to envisage their primary objective as providing data communications to the general public, with service for large-scale, dedicated users a secondary aim. Some PTT officials have seemed to expect that tariffs should enable some users to enjoy below cost services, while others would be charged above actual costs.

Throughout the dialogue on international data communication services the public utility concept has been an important part of the PTT approach to organizing merged computer-communication networks. The deputy director of the Swedish organization expressed these thoughts when he addressed the OECD conference on Computer Communications in 1975. "Telecommunications," Larsson said, "is a vital factor in national efficiency and the partnership with computing will -- if the technological planning is wisely carried out

-- enormously enhance its future importance. . . . There is, therefore, a case for public promotion and for subsidization of these services from funds raised by general taxes, in order to improve the general level of efficiency and productivity."[39]

Carrying out the public utility function has meant conflict between American companies and national telecommunication administrators in Europe and Japan. Many American companies (plus a growing number from other nations) have used dedicated leased lines because of the efficiencies of a private network. For many years the public telecommunication systems could not provide adequate and reliable service on their telephone circuits. Private leased lines were the only realistic mode available for data transmission. The PTT service improved only after the public systems began operating in 1978.

As public-switched data networks in Europe have been expanded and improved, the PTTs have been able to offer an alternative that technically meets the requirements of American companies. The PTT alternative would be more costly, however, for a user with heavy demands for transmission time. The tariff charged a large user on a public-switched network, based on time consumed or the amount of traffic carried, would be substantially greater than normal charges for a leased line. Smaller companies, not in a position to benefit from a dedicated line, would not be harmed; indeed, some smaller users might benefit from having larger competitors deprived of the costing advantage of lower unit costs from a leased circuit. Large corporations, as well as data service bureaus using leased lines, on the other hand, would be paying significantly increased charges. The telecommunication authorities at the same time would be earning significantly increased revenues.

The efforts of the PTTs to attract American users to the public systems have caused minor skirmishes already and promise to be troublesome for many years to come. By acceding to the buildup of private networks, the PTTs were following a less rigid policy because they could not otherwise respond to customer requirements. Permitting a leasor to interconnect with private switching equipment and to use sophisticated "value added" auxiliary equipment on private lines was a significant departure from traditional policy.[40] But the private systems with their extensive operations have become a matter of great concern to the PTTs. They challenge a traditional monopoly of telecommunications and are a bar to extending PTT control into computer usages. The PTTs, moreover, have made large financial investments in public data systems, incurring debts they can best recover by servicing the maximum number of users.

Private network users have equally strong objections to switching over to the public networks. The large multinationals, the international banks, the airlines, the scientific research groups, and the computer service bureaus have much to lose by shifting from the private to public networks. Many have invested large sums and are functionally committed to global information systems that would be seriously hampered by shifting to the public systems. Many find PTT service technically inferior and are skeptical of the ability of the European PTTs to keep up with the rapid improvements in telecommunication technology. Limitations imposed on equipment that is plugged in to the public system would create great difficulties. For many reasons the large American companies and the service bureaus have resisted, and can be expected to continue resisting, the efforts of the PTTs to limit or exclude leased circuits from data transmission usage.

The dispute has raised specific issues in several international arenas:

— Debate in the CCITT over proposals that private leased networks should be integrated with the public networks;

— Proposals in the CCITT that charges on leased circuits should be calculated on a usage-sensitive base rather than on a flat rate, or that charges on both public circuits and circuits dedicated for single users should be based on the same usage sensitive scales;

— Charges that U.S. network operators, encouraged by the FCC, violate CCITT recommendations that prohibit third-party traffic on leased lines and resale of telecommunication services;

— Accusations that Japan is restricting trade opportunities by prohibiting transfer between data processing centers within the U.S. of data transmitted by leased line from Japan to the U.S.;

— Charges that Germany inhibits U.S. exports of data processing services through regulations that require that data entering the country on internationally leased lines must undergo substantial data processing in Germany before they can be distributed.

The parameters of conflict have been laid out. If the contest were simply the PTTs versus the American multinationals, the outcome might be predictable. Logic is on the side of the French communication analyst, Jean-Pierre Chamoux, who concluded in his study of data transmission tariffs that "all the machinery is therefore in place with which to keep private correspondence a monopoly for the PTTs or their public service concessionaires."[41]

E. A Summing Up

But more than machinery is involved. Attitudes and interests in the European and Japanese business communities differ from the PTTs, and important schisms may widen, in particular between European multinationals and the CEPT and individual PTTs. American multinational users are not the only ones seeking leased lines. European companies and Japanese and Canadian multinationals are expanding business information systems which could operate more economically with leased lines. Broadcasters, newspapers, and a host of other innovative users from many countries, not just the U.S., are anxious to have dedicated lines available for technical as well as pricing purposes.

Moreover, communication deregulation in the United States is attracting attention in Europe.[42] Mrs. Thatcher's government has begun a three year phase-out of the British Telecom monopoly over the supply of terminals and other subscriber apparatus, after detaching the postal service from British Telecoms in 1980. The Japanese Government has promised that Nippon Telegraph and Telephone Public Corporation (NTT) will open up its purchasing of supplies and equipment to outsiders, and it has agreed to accommodate the U.S. service bureaus on the question of data transfer within the U.S. Both Japan and the Netherlands have established investigative bodies to study the role of the PTT and possible ways to deregulate modern forms of data communications.[43] The Commissioner for Industry of the European Community, Etienne Davignon, has urged the PTTs to relax their hold on telecommunications and permit freer interchange among the European Community members.[44]

It is possible that these two forces — the one functioning on the corporate side through multinational companies, and the other functioning on the government side through officials who seek government efficiency through deregulation — could have a significant effect on the development of both national and international computer-communication networks. It may not be a foregone conclusion that data communications will be "a monopoly for the PTTs or their public service concessionaires."

In other areas of information technology, the European, Japanese, and Canadian companies have overcome much of the initial technological advantage of U.S. producers but have not, with some exceptions, been able to forge ahead on the frontier of research and development. Some companies may be strong enough to keep up the technological pace set by the Americans. Several can be expected to contend actively. Most face a different set of optional strategies.

1. For many companies in Canada, Japan, and Europe, the most attractive option may be to concentrate on products and services within the technological frontiers of the computer and communications industries. This means commercial exploitation of technological advances rather than their discovery. It means relying on production and administration efficiencies to maintain a competitive position against more technologically adventurous U.S. firms. In many fields these foreign producers can compete on even or better terms with U.S. competitors. In more settled markets, where cost-price margins are small and production efficiency is more important than product innovation, the American may be at a disadvantage.

A correlative trade strategy would focus on markets where demand is less oriented to the latest technologies and users are willing to accept

something less than the latest technology. This suggests sales and commercial export efforts in the Third World, and secondary markets in the more advanced nations. The innovations and economic stimulation programs that have been adopted in Europe and Japan in the past few years have leaned strongly towards encouraging information technology competition along these lines.

2. Japanese companies appear to have brighter prospects in technological competition than the Europeans. They should be able to rely eventually on homegrown fundamental R&D as a result of dedicated national policies that are intended to create a scientific community capable of making "significant contributions to the 21st century." But not tomorrow. Except for certain technologies where the Japanese have already made considerable progress, the Japanese companies are not likely to be in a position to look to domestic sources for the basic knowledge and the inspiration for information technology innovations for another decade or longer.

3. For many Japanese and European companies, heavy reliance on U.S. technology may not change much in the foreseeable future. Neither group is likely to shift patterns of collaboration, joint enterprises, and licensing arrangements with American companies that have been characteristic of the past. European and Japanese companies may follow the takeover and merger habit in the U.S. — particularly where they have a special need for gaining access to U.S. technology or marketing competence.

4. But U.S. technological leadership could become increasingly honorific. Many governments have been impressed by the Japanese success in concentrating R&D on commercial targets. Some have installed second strike R&D strategies. Others have strengthened the commercial side of their R&D

systems.[45] Such policies concede U.S. technological leadership and aim instead at overcoming its commercial consequences by minimizing the time required to nullify the initial advantages of technological innovations. They function through direct and indirect government backing of the second striker's R&D efforts. France and Brazil follow such aggressive strategies. The French program, started by the Giscard d'Estaing government in 1978 (see pages 55-56 following) and reinforced by the Mitterand administration, has been given greater political stature and additional funding through nationalization measures in 1981-82.[46] Brazil's R&D policy has a similar orientation, but has to overcome greater technological gaps.[47] In both cases commercially aggressive R&D has been characterized by a willingness to absorb start-up costs of innovative producers. Adoption or intensification elsewhere of the second strike strategy could pose serious difficulties for American producers.

5. Continued efforts to strengthen European community-wide or regional collaboration in research and development are likely. More corporations in Europe may follow the strategy that companies in Canada and the smaller European nations have sometimes found successful, of narrow specialization in interdependent production and services relationships with producers in the U.S. and Japan. Such strategy, if permitted by the European governments, could result in extensive de facto collaboration that has so far eluded the attempts of the European political organizations to achieve a formal cooperation on an official level.

6. Companies in several developing countries have begun to emerge as exporters of information technology products. Brazil, Mexico, Singapore, South Korea, and Taiwan, for example, have reached a development level where technological skills--professional as well as worker--are

sufficiently numerous to support competitive production of the simpler electronics and communications goods.[48] Production in Brazil and Mexico tends to be in public enterprises and is often heavily subsidized. The Asian producers are in the private sector, generally subsidiaries or spin-offs from U.S. and Japanese multinationals that set up operations in the early 1970s. Although receiving modest public assistance, the Asian companies tend to be cost competitive in their best product lines, providing components and semi-assemblies. Many of these companies are avid importers of U.S. and European technology and licensing rights, and can be expected to be aggressive and expensive competitors, with active encouragement and support from governments, in future information technology trade.[49]

For most developing countries, however, information technology trade is viewed as another aspect of their "have not" perspective in technology.[50] Public preoccupation is with developing an information technology infrastructure and the principal issue pertains to the relative roles of the private and the public sectors. A question of paramount importance concerns the ability of domestic companies to compete against what appears to be overwhelming odds presented by the multinationals of the advanced nations. Few officials, public or private, view their prospects optimistically; most anticipate that infant industry protection will be essential.[51] For most operating companies in the developing countries, whether public or private, the most pressing information trade question involves importing technological data. The development of an on-line data-base industry is often regarded as a sensible first step towards more complex information technology production.[52]

Although the infrastructure building may be incomplete -- indeed it is only well started in most nations -- the dramatic improvement in both the corporate and public capacities throughout the OECD area has changed the strategic balance for international competition in information technology trade. An important consequence is that other OECD members are in a more favorable position for taking diplomatic action that might alter the competitive rules to their advantage. The tempo in OECD has stepped up, resulting in growing contention that is described in the following section.

III. International Contention over Rules for Information Technology Trade

The evolution of information technology brought the industry to a phase in the 1970s in which data communication services and their applications became much more prominent than previously. As a result of widespread availabilities of computer technology and advancements in telecommunications, intra-corporate applications of data communications multiplied in both numbers and intensity.

International usage grew almost as rapidly as domestic. Data communication became an integral part of the daily functioning in much international business, and an integrated element in the management and planning of many multinational corporations. By 1982 an information management division had become a prominent operational component of virtually all U.S. -- as well as many Canadian, European, and Japanese -- multinationals. Much of the information service needs and a high proportion of transborder data flows, consequently, were taking place wholly within the multinational firms.

Because of the importance of transborder data in international commerce, impediments to the flow of data could do considerable harm to the affected enterprises. "It is thus in our interest," concluded W. Michael Blumenthal at the 1981 National Computer Conference, "and, I believe, in the interest of all countries, to ensure that free data flows are preserved and that vitally needed rules of the game are established."[1]

A. Americans Seek "Barriers Against Barriers"

Blumenthal's call for "vitally needed rules of the game" implies a belief that the old rules do not prevent restrictions on data flows. An

important endorsement came from the U.S. Trade Representative. Ambassador William Brock described at OECD in June 1981 the general concern in the U.S. about the "absence of a coherent international framework for resolving trade problems in services."[2] Corporate and congressional leaders have echoed similar thoughts, and it would appear that Brock and Blumenthal have widespread, though not universal, backing in the U.S.

These American commentaries have not yet been reflected in concerted policies. They do represent growing concern that "something needs to be done" about potential interferences with the international flow of data. What should be done and how it should be done are questions that have yet to be spelled out in detail. It is evident, however, that details of a concerted policy must be carefully considered. Fundamental philosophical and practical differences exist between Europeans who want "regulators" to enforce the free flow of data and Americans who want a "framework of rules" to ensure free flows.[3]

These are familiar differences. What is novel in the growing controversy is that the differences in an age of growing interdependence are internationally consequential to a far greater degree than ever before. And it is not clear how and under what terms the differences will be accommodated.

American officials have been cautious and circumspect when questions of change in legal infrastructure arise. They have accepted gradual and carefully weighed changes on specific matters, but have been guarded about the possibility of more fundamental changes. President Carter's Under Secretary of State, Matthew Nimetz, replied to a congressional query last year that "experience is too brief to warrant a binding international treaty . . . that could inhibit research and development and applications

in this fast advancing technology."[4] Speaking to an OECD group later, Nimetz conceded that "some measure of harmonization of national policies is both feasible and needed, at least within OECD. . . . We may, in effect, need barriers against barriers."[5] The President's national security advisor spoke in a similar tone to a French audience in 1979 of the importance of information technology in international affairs that "must be understood in a new conceptual framework."[6]

The Reagan Administration has followed the same discreet line as its predecessor. Explaining the U.S. position in support of the OECD Guidelines on Personal Data Flows, Secretary of Commerce Malcolm Baldrige emphasized the limited nature of the agreement and justified it because "this voluntary agreement might forestall restrictive foreign legislation."[7] The State Department's principal spokesman, Under Secretary James Buckley, has not dealt specifically with the question of a new international regime, but has indicated several times that the Reagan Administration is not considering any radical departure from previous policies.[8] The U.S. Trade Representative has spoken more specifically of a "key policy challenge" confronting the OECD countries. Ambassador Brock proposed devising an approach to international negotiations that will minimize restrictive trends without "forcing governments to commit themselves in great detail on policy issues that remain uncertain."[9]

B. Access Reciprocity: A Deterrent to Data Restrictions?

A growing number of U.S. business spokesmen have shown impatience at the pace with which the U.S. is developing "barriers against barriers." Some have expressed strong concern about growing government intervention abroad and have advocated direct bilateral action when specific barriers

have been created. Here are four samples of foreign intervention that have been cited by American businessmen:

-- The passage of the Banking Act in Canada in 1980 under which banks "shall maintain and process in Canada any information or data relating to the preparation and maintenance of such records." The intent of the act evidently is to prevent bank records from being processed outside of Canada unless they are also processed inside Canada. A 25 percent protective barrier on imports of computers and peripheral equipment is another costly annoyance that has been around for several years. Indeed, some Canadians have felt that the large tariff on computer equipment has seriously handicapped Canadian competitiveness in data processing, thus making it necessary to seek protection in legislation like the Banking Act.[10]

-- Brazil's strict administrative monitoring of computer imports and data communications.[11] The controls have been used to compel U.S. banks and other multinationals to invest in Brazilian manufactured computers and auxiliary equipment that is costlier than imported U.S. equipment and often exceeds their requirements for computer usage. The Brazilian regulators often deny permission for manufacturers and other users to import U.S. data services, or to rely on corporate systems outside of Brazil. Brazilian controls are administered to the detriment of both U.S. suppliers of goods and services and American companies.

-- The imposition of severe operating restrictions in Japan for American companies trying to market data processing services. Japan prohibited the American companies from marketing services out of more than one company facility in the U.S., making it impractical for the Americans to offer services available only at sites other than the one point of entry. The U.S. under secretary of state described these restrictions as

making it "virtually impossible for American companies to operate data services to Japan from the United States."[12]

-- A BundesPost regulation in Germany that restricts the use of international leased lines that multinationals operating in Germany may rely on for corporate communication networks. The BundesPost regulation prohibits international leased lines from being connected to German public networks unless the connection is made through a German computer which does some data processing. Such usage would not only be a useless expense, it could also compromise intra-corporate communications.[13]

These examples of restrictive measures are important in themselves, for they have been damaging to marketing of U.S. services even when eventually corrected. But they would be less important if they were isolated instances and did not fit into a perceived pattern. Many American businessmen have testified to a trend they have observed. If it were to continue, they have said, the trend would undermine information hardware and service marketing and other international corporate interests.[14]

This perception of mounting restrictions on information technology trade has been reinforced by fears that governments might turn to policies that would be restrictive in result even when imposed for other reasons. The Vice President of American Express, Harry Freeman, for example, testified at hearings on transborder data flows in 1980. Freeman declared his approval of "the general regulation of privacy, which in fact we favor," but warned of the "possibility that those laws could be turned to favor, say, domestically based companies over foreign based companies in a discriminatory way."[15]

Many U.S. businessmen are more troubled by the legislative and regulatory proposals that are under consideration than those they have

already encountered. Earle Kendle, Vice President of the Eaton corporation, has testified on this point. He told the House Operations Sub-Committee, "we need to influence that which is currently being talked about. I certainly hope we do not run up against rules and regulations which are passed by countries of the EEC in which we have very little influence at this point."[16]

The regulations on data communications and the prospect of even stronger restrictions have chilled decision making on expanding corporate information systems. While making adjustments to meet the requirements of personal data protection laws that have already passed, decisions on investments "have been shelved in the face of the current uncertainty about the future rules of the game."[17] Investment postponement, the U.S. Trade Representative's office has stated, has not been limited to the primary producers of information goods and services. The impact may be greater in the secondary sectors, the banks, finance institutions, the oil companies, auto and chemical manufacturers, and others that rely on sophisticated worldwide information and management systems. They don't want to be caught with a large investment in a system that may have to be altered or written off altogether. The net result has been a blow to improved productivity and economic growth when the U.S. -- and the rest of the world -- can least afford it.

A second effect of the prospect of increasingly stringent barriers to data flows has been the growing support for answering restriction with restriction. Access reciprocity has been advanced not just as a policy for getting balanced treatment for U.S. interests, but also as a deterrent against a growing pattern of restrictions abroad. A witness before the Congressional hearing expressed the opinion that "the United States must

make foreign nations aware of its sense of the critical relationship between international telecommunications and international trade . . . by increased emphasis on international telecommunication services in the context of trade negotiations, or by the implementation of a policy of reciprocity at the Federal Communications Commission."[18] The House Committee on Government Operations concluded that "most foreign governments are restricting the entry of U.S. telecommunications and data processing services. Under the Communications Act, the Commission has the power to ensure that foreign enterprises receive no better treatment in this country."[19]

Access reciprocity would mean that regulatory agencies such as the Federal Communications Commission and policy agencies such as the Department of Commerce could exercise existing authorities, or be legislated new authorities, to assure that denial of access to U.S. firms could result in a comparable denial of access for firms or authorities seeking entry to the U.S. market.

An example of access reciprocity in hypothetical action might be drawn from the case cited above involving the marketing of data processing services in Japan. In this instance the U.S. government weighed the linkage between the restriction on U.S. firms and a comparable application for a Japanese entry into the U.S. market. The petition to the FCC to begin "Venus system" operations involved U.S. international carriers, as well as the Japanese affiliates.[20] The Japanese application was not formally opposed by the U.S. government, and the FCC authorized the service without a reciprocal condition. Prior to the FCC decision, the U.S. discussed the linkage with Japanese officials through diplomatic channels, discussions which were continued after the FCC decision and which

eventually led to an easing by Japan of the restrictions on one of the American firms. But the diplomatic channels, in this case, required five years to bring about a satisfactory answer. It is possible that a linkage made in stronger terms, and in the context of access reciprocity as a specifically announced policy, might have led to a more rapid solution.

Joseph Markoski has justified access reciprocity in these terms. He has written, "Had such an unambiguous statement of congressional intent been in existence at the time that Cable and Wireless denied service or at the time that KDD restricted the use of leased channel circuits, it is questionable whether either foreign administration would have acted the way they did."[21]

The trade policy statement issued by the U.S. Trade Representative in July 1981 contained an implicit warning to America's industrial and high technology partners that "reciprocity" is the factual condition of U.S. free trade policy.[22] Ambassador Brock indicated that if reciprocal access to markets were not accorded as a matter of international comity and established agreements, the U.S. would look to other means to keep trade and communication channels open.[23] "Our request," he said after a meeting with EEC, Japanese, and Canadian officials in January 1982, "is that their markets be as open as ours."[24]

In the free trade system that has characterized world trade since GATT, the World Bank, and the International Monetary Fund were set up in the post-World War II period, access reciprocity would be more appropriately employed as a diplomatic tool rather than as a retaliatory tool. "Linkage" could be established, Willis Armstrong of the U.S. Council of the International Chamber of Commerce has suggested, between a potential obstacle to U.S. export or services trade and a potential response of rough

equivalence in U.S. imports.[25] If such "linkage" showed that an action contemplated abroad would be fully offset by a reciprocal act by the U.S., the "linkage" could serve as a deterrent to the originating action. By convincing the trading partner that a proposed barrier would be countered by a compensating barrier and the trading partner would therefore gain nothing, the potential restrictive action might be deterred.

The "linkage" concept of reciprocity fell short, however, of what many in the industry believed was needed. They wanted a policy with sharp teeth and sought it through legislation that would virtually mandate action under stricter and narrower definitions of reciprocity than the Administration practiced. The Association of Data Processing Service Organizations (ADAPSO) lobbied for legislation that would authorize the FCC to investigate every "charge, practice, classification, requirement or provision" inflicted on American carriers abroad in order to determine whether the condition imposed was "just and reasonable, promotes the public convenience and necessity, and ensures the equitable treatment and competitive position of the United States enterprises in international markets."[26] ADAPSO also wanted the FCC to have legislative authority "to restrict, condition, or prohibit the use of facilities service, facilities, and instrumentalities" to a foreign telecommunications service whenever the Commission determined this to be necessary or appropriate to assure that these objectives would be achieved.

But ADAPSO and other information technology interests were not the only ones seeking government support for international grievances. Many other industries sought access reciprocity. The clamor for retaliation legislation against foreign trading restrictions grew to faddish proportions. Feeling the heat of growing competition for export markets

that were sliding into recession, numerous corporations, trade associations, industrial and farming groups flooded Washington with demands for legislative action. Many thought they could gain better access to markets abroad if access to markets in the U.S. were threatened. The 97th Congress was inundated by proposals. In early 1982 more than 30 trade bills had been introduced proposing some form of trade reciprocity.[27]

The most important of the bills and the one on which consideration of reciprocity's fate centered was that of Senator Danforth, the Chairman of the Trade Subcommittee of the Senate Finance Committee.[28] Danforth had a strong record as a free trade advocate, but by February 1982 he seemed ready to abandon the faith. "My view," Danforth said, "is this country has got to rebuild its economic strength in the years immediately ahead and that cannot be accomplished if foreign countries shut out American goods... If we complain loud enough and whine and plead and threaten perhaps the Japanese will change. That has limited effectiveness, and is demeaning. The notion of reciprocity and trying to put together a bill is an idea that has evolved in the last few months as it has become clear rhetoric is not effective and creates ill will."[29]

Danforth's bill, accordingly, gave the President authority to act against countries that do not give "substantially equivalent commercial opportunities for American firms." The bill called on the President to act by "withdrawing earlier trade concessions, imposing duties, fees, or imposing other restrictions."[30]

In the telecommunications field reciprocity was proposed in House and Senate bills amending the telecommunications act and the role and authority of the FCC. The bills closely followed the language suggested by ADAPSO. They would in effect direct the Commission to assure that the terms and

conditions for foreign telecommunications services to use U.S. facilities should be no more favorable than those available to U.S. enterprises using facilities abroad.[31]

The Administration reacted vigorously. Although Ambassador Brock, in the eyes of many, had given a critical assist to the reciprocity movement, he quickly clarified his position once it became apparent that things were getting out of hand. "Market access is a reasonable goal," he testified before the Senate Finance Committee, but not to be achieved by legislation that would "require this country to retaliate automatically against discrimination by other countries."[32]

Brock and other Administration figures held that reciprocity in the sense of a global balance was a fundamental element of American trade policy. But narrowly construed reciprocity would be detrimental to U.S. trade interests. Applied sectorally, it would almost certainly lead to similar policy in other countries, and the escalating retaliation would be most damaging where U.S. exports had the greatest comparative advantage, such as telecommunications and information technology. Applied bilaterally, access reciprocity would be contrary to the most favored nation principle that the U.S. had favored historically. It would undermine years of effort to champion multilateralism in the GATT. Narrow reciprocity would make both bilateral and multilateral trade negotiations more difficult, especially in industries of greatest U.S. strength.

Aside from its objections on economic and precedent grounds, the Administration protested the very notion that Congress would circumscribe policy making in the Executive Department. The thought of Congress delegating authorities that should properly remain in the Executive

Department was especially offensive. With particular reference to the telecommunication proposals, the Administration objected to giving authority over trade negotiations to the FCC. "Independent regulatory agencies," according to the State Department, "have a legitimate role to play in the administration and regulation of particular sectors, but this should not extend to formulation of trade policy. Such a delegation of power would destroy the authority of the President and the Trade Representative to negotiate binding agreements, implement concessions, and assure others that we would honor our international commitments."[33]

The Administration, it appears, made an effective case against narrow reciprocity. When the Senate Finance Committee approved the Danforth bill on June 15, 1982 the reciprocity language had been modified significantly.[34] The earlier formulation had called for retaliation against another country's exports whenever U.S. exporters were not given "substantially equivalent market access." As approved by the Finance Committee, retaliation would be called for when U.S. exporters were not afforded "fair and equitable market opportunities."[35] Focussing on "equitable opportunities" rather than "equivalent access," the bill satisfied the Administration which gave its full backing.

Supporters of stronger retaliation legislation may be able to reverse or revise the Finance Committee's decision. But much of the steam behind the access reciprocity movement seems to have vented. Other efforts to legislate narrow reciprocity seem to be in limbo. In particular, the proposal for added FCC authority has gone down with the abandonment of deregulation legislation for the telecommunications industry.[36] Enthusiasm for reciprocity, moreover, seems to have waned. It may be instructive to speculate about one of the reasons for this development.

An important factor in the discussion of reciprocity legislation has been the coupling between unilateral retaliation by the U.S. and the effort in GATT to draw up liberal rules and conditions for services trade. The Administration's strategy seemed calculated to show U.S. information technology producers that they might have multilateral liberalization in GATT, or narrow legislated reciprocity, but not both. While the Europeans have gone along with U.S. proposals for beginning negotiations on services trade, they have not done so with unqualified enthusiasm and would hardly regard a trade war on access reciprocity as the felicitous way to begin.[37] The negotiations on services might be fatally flawed. On the other hand, as the Danforth bill endorsed "global reciprocity" and gave the Administration authority to begin the GATT negotiations on services trade, the linkage between unilateral and multilateral approaches to policy making has been strengthened.

In any event, reciprocity has become more deeply instilled as U.S. trade policy. The Danforth bill, though modified, is an affirmative declaration that retaliation is an authorized means of responding to restrictive trade practices abroad. If and when the bill is approved it would become an important element in policy for information goods and services, and the international rules governing the trade.

C. The Case for an International Legal Infrastructure

The United States has been far more resistant than any other government to making changes in the international legal infrastructure for information technology trade. American companies are prospering under the existing structure and see little need for change, except for that which might limit the imposition of national barriers. Other governments, whose

enterprises may still feel disadvantaged against the Americans, see things differently. Some have been much less restrained in calling for new rules on issues of the information age. Several in Europe have advocated a binding treaty on personal data flows, rather than the voluntary "Guidelines" that was actually adopted. A few have agreed to the binding Convention of the Council of Europe on personal data flow protection. While sympathy is not lacking for the U.S. view on approaching a new international regime cautiously, several OECD members have begun pressing in the past five years for more urgent action on international rules.

France's Minister of Industry Andre Giraud addressed these issues before the OECD High Level Conference on Information, Computer, and Communications Policy in the 1980s. Giraud described how France was dealing with computerization in a national plan adopted in 1978 and implemented in specific measures since then. He outlined some of the international implications of the plan.[39] The French plan is a national guide, he said, for the use and application of robotics, microelectronic devices, computers, data networks, and related equipment and technical knowledge. The government sets priorities for national informatics development and for government agencies that are expected to implement them. A long term goal is a system of decentralized computer usage and grass roots involvement in decision making, to avoid what Giraud called "taylorism of information technology." French policy, Giraud explained, is to use governmental power and influence to guide, control, and direct the national development of information technology.

France cannot act alone, said Giraud, when a worldwide communication infrastructure links computers within networks that transcend national boundaries. Therefore, Giraud concluded, "France, which has embarked on

the path of social control of computerization, is seizing the opportunity provided by this conference to issue an appeal to the other nations: let us act together to prevent this computer technology of subservience." Among the objectives of acting together that Giraud proposed were "international balance of computer technology," an end to "hegemony in the economic and cultural fields," and a "legal infrastructure to sustain the transition to the information economy."[40]

Giraud's proposal has attracted widespread support among the OECD members. The small nations, in particular, have embraced the French appeal to act together and have even adopted concepts from earlier Third World resolutions in UNESCO "to make the ideal, not free flows of information, but free and balanced flows of information."[41]

But supporters of the French appeal have introduced important nuances. Some of Canada's reservations are especially relevant, even though the official Canadian positions do not contest the main elements of the French case. A major concern of Canada, expressed in a formal submission by their Department of Communications, is the implication for its national sovereignty when vital information is moved outside the jurisdiction of domestic authority.[42] According to this report, Canadian control over information security is endangered; vulnerability to work stoppages and breakdowns and natural disasters is increased. Canada's ability to attract high-paying computer service occupations is impaired, the report states, when an imbalance exists in computer technology. Job losses have an important part in the Canadian assessment of information technology, and government predictions of large numbers of jobs emigrating to the United States have provoked a wide variety of proposals for job protection in the data processing and other software trades.

Despite these strong views that seem to justify forceful action, Canadian official spokesmen have dealt with the judicial problems cautiously and pragmatically. They contend, as U.S. officials have, that legal questions should be deferred until there is a clearer understanding of all the issues.[43] Their ambiguity reappears, however, when they urge OECD members to seek immediate agreement on "effective mechanisms for cooperation" -- but without making it clear how mechanisms for cooperation can be effective in the absence of agreement on the issues, or explaining why Canada is a conspicuous holdout in approving the OECD "Guidelines" on personal data flows, which other OECD members consider an important mechanism for cooperation.

Perhaps the ambivalence of Canada toward information-communication issues is, as Oswald Ganley has explained, because proximity to the United States makes Canada a "special case."[44] The Canadian Associate Under Secretary for External Affairs de Montigny Marchand expressed this thought at the 1981 conference of the International Institute of Communications in Strasbourg, France. Marchand wanted, he said, "to manage, from the Canadian viewpoint, all the interrelated aspects of Canada/U.S.A. communications relationships, which I dare say is the most complex and sophisticated such relationship between any two countries in the world. We are not there yet."[45]

There are other reasons for Canadian ambivalence, which could have deeper roots than are suggested by official positions in OECD. Some Canadians may favor a "hard line" on international communication and information issues, but others are more concerned about what an "international hard line" would mean inside Canada. One dissenter is Quebec's minister of communications. Gaston Beausejour has phrased his

thoughts in a familiar fable, concluding with the hope that "the Canadian Government(s) will not kill the chicken by opening up its intestines in an attempt to regulate and control its ability to lay the golden eggs."[46] To the contrary, he added, "Canadians want to have an opportunity to breed a few generations of chickens of our own which will have an ability to lay some of the golden eggs of the Information Age."

A second source of dissent to an "international hard line" comes from within the business sector itself, also questioning the effect of controls that go with protection. George Fierheller, the president of Systems Dimensions Ltd. of Ottawa, has expressed a view that a large number of Canadian businessmen evidently share. Summing up as chairman of a U.S.-Canada business conference, Fierheller asserted rather bluntly, "the only people in Canada who were really pushing for any particular action in this field at this point in time happen to be the government."[47] He added, "preemptive legislation before the extent of the problem is really known could be detrimental to better international understanding."

D. An American Strategy in OECD

Many loose ends can be seen in the French-inspired drive to establish an international legal structure in OECD that would "sustain the transition to the information economy." The issue has more than commonplace commercial interest because of the proclivity in several nations to associate data flows with political and security interests. Assertions are made that computer networks of multinational companies remove decision making on employment, national investment, and social growth from the hands of national authorities. Such allegations are widely accepted as evidence that a comprehensive, international legal regime is needed. The proponents

have picked up enough support in OECD to bring the proposal to the brink of action. There it poses a difficult challenge to the U.S.

American policy, according to Under Secretary Nimetz, has consistently advocated delayed action through study of the economic, social, and political issues arising out of the growing usage of information technology.[48] Too little was known about the "real" consequences of the new technology, and even less about the "alleged" remedies to "uncertain" problems. In the absence of thorough study, precipitate national or international action, it was reasoned, would run the risk of stifling innovation and creativity in fields where technological development was advancing rapidly, and where it was desirable that advances continue.[49] Action which had not been thoroughly examined, moreover, might interfere unnecessarily with the flow of data on which international commerce had become so dependent, ending up doing more harm than good.

The "study mode" strategy has been pursued flexibly. International agreements have been negotiated where factual study has shown them to be justified. Negotiations on technical and service standards have been carried out in ITU. They have led to compromise on several important matters and have facilitated uniform technical and pricing standards. The U.S. participated in negotiating the OECD Guidelines on Personal Data Flows, which covered an exceptional human rights area of information technology in an agreement approved in 1980. The U.S. has been an active participant in ITU's World Administrative Radio Conference programs for deciding on radio spectrum allocations.[50] The U.S. has participated actively in important discussions to establish worldwide standards for videotex services that the Department of Commerce expects to develop into a $15- to 20-billion market over the next decade.[51]

In the past three years international attention has turned increasingly to commercial information flows and multinational data communication networks. U.S. strategy has undergone subtle changes, albeit under the pressure of circumstances. More and more nations have been considering possible detrimental effects for their economic and political interests. Conferences have been called in OECD to review such questions as "vulnerability of a computerized society" and "the impact of microelectronics on productivity and employment." The U.S. response to this direction of interest has been proposals to consider in OECD and GATT the actual effect of data flows on multinational companies, and to collect information on obstacles to information flows.

These subjects are covered in an important U.S. proposal that OECD should study "Economic Aspects of Transborder Data Flows."[52] The study is aimed at compiling information on the structure and operations of multilateral uses of data flows. The data base for the study will be built on answers to a questionnaire distributed by national units of OECD's Business and Advisory (BIAC) Committee to multinational firms.[53] The questionnaire, sent out in June 1982, asks the companies to give details of problems encountered in transborder data trade and seeks information on the extent to which transborder data enters into their business. GATT has also begun working on an information base, at U.S. prodding, to identify and reduce barriers in service industries, including telecommunications, data processing, and information trade. [54]

A related U.S. proposal to the OECD Trade Committee has suggested that the code coming out of the Tokyo Round on technical barriers to trade could be used as a model for an "international agreement designed to assure that domestic regulations are transparent and administered fairly."[56] A

services code could serve, the U.S. paper indicated, as a possible framework of rules that would assure that national measures would have minimal restrictive effects on trade in goods and services. This approach could build on earlier OECD "Liberalization Codes" that dealt with current invisible operations and on capital movements.[56] Presumably a code on information services covering domestic regulations affecting data flows would be folded into the GATT negotiations on trade in services, though the formula for accomplishing this has not been spelled out to OECD.

The U.S. has also proposed as an interim measure a "Declaration on Data Flows" that would commit governments to refrain from imposing restraints during the inevitably long period needed for establishing any long term arrangements.[57] A draft "Declaration" was formally submitted to OECD in January 1982 and has been discussed in subsequent meetings.[58] The one page text would pledge OECD members (a) to an open system of international data flows, (b) to avoid restrictive measures that would disrupt the flow of information, and (c) to continue consultation on data and information flow issues.[59] There are several precedents in OECD for this type of commitment. Although not binding on its members, an OECD Declaration would be an authoritative benchmark for policy makers. Some other members have been lukewarm to the proposal, though a "Declaration" in some form is expected to be approved.

This web of activity in GATT and OECD has set in motion a chain of events that could contribute to the "coherent international framework for resolving trade problems in services" that the U.S. Trade Representative has been advocating. The tides are strong, nevertheless, for the "regulatory regime" that some officials of other OECD nations have been urging, and which would give international approval to national controls

over computer and data processing operations similar to those in national and international telecommunications. As the tempo of unilateral policymaking on commercial data flows appears to be increasing, it is possible that a de facto "regulatory order" could come into existence by default — possibly more onerous than one sanctioned by agreement.[60]

OECD discussions opened in 1981 on the "Bing Report" on Legal Issues Related to Transborder Data, which is a preliminary study to develop an outline of a "coherent legal system regulating transnational data flows."[61] Debate on the "Bing Report" (named for its principal author, Jon Bing, an OECD consultant from the Norwegian Research Center for Computers and Law) has barely opened. The U.S. has raised spirited objections to several legalisms in the report.[62] Early discussions, however, seem to suggest that OECD members, excluding the U.S., regard the report as opening the way for drawing up a formal document for a legal regime on transnational data flows.[63]

The "economic aspects" study and the "Bing Report" will probably proceed on parallel tracks in OECD. Unless important members opt out of the discussion, OECD members may well be looking for middle ground between "an international framework of rules that minimize restrictive trends" — that the U.S. has suggested -- and the legal infrastructure "regulating transnational data flows" — favored by France, Sweden, and others to varying degrees. There are two reasons for thinking that the U.S. position in the debate could be an advantageous one.

1. Some of the underlying assumptions of the regulatory advocates are becoming invalid. In particular, the U.S. hegemony in information technology trade is no longer as pronounced as it was when the concepts of regulatory requirements were originally formed. European and Japanese

multinationals, like their U.S. counterparts, are having to rethink corporate strategy. Earlier sections of this paper show that the competitive positions of European, Japanese, and Canadian producers have steadily improved. Technological diffusion has been fluid, and the analysis herein supports Edwin Mansfield's conclusions derived from different evidence that international transfers of technology have speeded up in the past 25 years.[64] As a consequence, U.S. technological predominance may provide less of a lead in production and marketing and less of an advantage in commercial trade than it once did. Whatever commercial advantage technological leadership may give to American companies does not appear to handicap competitors unduly in gaining commercial status through production and marketing efficiency.

2. Many European and Japanese corporations are discovering the advantages of sophisticated information management systems and have made great strides in employing them. They are learning, in the process, the importance of having uninterrupted transnational communications and are beginning to make their thoughts known. The OECD questionnaire will provide an opportunity for them to highlight the obstacles they face in transborder data flows, including especially the impediments they are encountering in exports and data flows to the U.S.

Growth of Japanese international data communication systems has been extremely rapid in recent years.[65] In the period 1977-80 Japanese systems doubled in number, from 47 to 116. Expansion, moreover, has been primarily centered in finance, trade, and manufacturing multinationals. These firms have installed three-fourths of all Japanese international data communication systems, and have been expanding at about 40 percent a year.[66]

The Antonelli Report of OECD provides specific evidence on this point.[67] The report is an analysis of data communication usage in twenty-four Italian firms. It describes Italian multinationals that have started using the technology in integrated systems in recent years, or are employing data communications directly in their businesses. Some of them credit the systems for remarkable changes in corporate fortunes, particularly in expanding foreign operations. Antonelli concludes that there is a growing trend among the Italian multinationals toward data communications systems because of the gains in corporate efficiency and the financial economies that an integrated system makes possible. Several have entered new operational fields that would have been closed except for the data communication systems. This would suggest that the European governments, if the Italian experience is generally applicable, face increasing pressures from their own business communities for rules that would encourage international data flows and against rules and regulations that would hinder them.

An important sign of the increased action of European firms is what they agreed to do in the International Chamber of Commerce. A Commission on Computing, Telecommunications, and Information Policies was established in 1981.[68] Its function is to coordinate the study of policy issues and strengthen business participation in national debate. The Commission provides or arranges for factual information to be available to national affiliates in addressing the problems of information technology advancement and encourages an active stance on these issues. The International Chamber and other international business groups such as the BIAC are likely to have a prominent role in these issues in OECD.

IV. Five Questions on the Future of Trade in Information Technology

The discussions in OECD and GATT are important in themselves. They are also a part of a larger international network of activity in communications and information. For the U.S. policy maker, their greatest relevance may be the critical bearing they will have on the emerging global controversy over communications and information. Of particular significance is the complex inter-relationship between OECD-GATT and the conferences on satellite communications and radio spectrum allocations that ITU will be conducting during the 1980s. These ostensibly technical conferences of ITU — permeated in reality with political and economic controversy — will attempt to define technical standards of profound conseqence to the trade of the U.S. as well as other nations.[1] Equitable and liberal conditions for information technology trade will not be negotiated in a vacuum; they can evolve only in the context of an international environment whose content and adequacy may well be a major item on the international agenda for the next twenty years. Here are five questions that American corporate and national leaders should be preparing to answer.

A. Are New Rules For Information Technology Trade Necessary Now?

New rules and new applications of old rules are inevitable. The relevant policy questions are when and how new rules will come into being, and what they will do.

A number of OECD members are pushing for negotiations on a broad international regulatory agreement in the near future. American corporate

and U.S. government leadership have resisted moves that would radically or prematurely alter the present conditions of trade. Such caution is warranted. But there are three unique considerations for the U.S. in moving the process sooner rather than later. First, the market leadership that American companies have in information technology trade thrives in stable conditions for markets; OECD and GATT negotiations could diminish some of the nervousness about an unstable future for the trade. Second, early movement toward agreement in OECD and GATT could serve as a useful precedent and help keep other international information controversies on satisfactory tracks.

The third is the most important. If the U.S. does not lead the initiative toward a liberal regime, no one else well. It is often assumed that U.S. resistance to international agreement on information is a reflection of the benefits that U.S. corporations have enjoyed from the present conditions of trade. This may be true. But it is at best only a partial truth. A more fundamental factor in the U.S. position is adherence to the principles associated with the liberal international trading institutions -- GATT, IMF, and the World Bank -- that the U.S. led in establishing in the post World War II period.

The U.S. has opposed drawing up an international regulatory agreement in OECD, which would be contrary to and would dilute that practical application of these liberal free trade principles. The U.S. has also opposed the proposal because its sweeping coverage would have hidden as well as unforeseen technological and commercial implications. It would be detrimental to interests of commercial enterprise of other countries.

The U.S. position has sometimes lacked credibility, however, by being advanced in defensive situations where U.S. export market positions were

under attack. There should be no legitimate question that U.S. policy on information technology trade rests on these principles.[2] Yet there is. Failure to advance an affirmative initiative under the liberal regime has created doubts where none should have existed. Defense of U.S. commercial interests, furthermore, has been made far more difficult than necessary.

The U.S. has made significant corrections in policy style in the past two years. This is most evident in the U.S. proposal that GATT undertake a new round of discussions on services trade, as well as important follow up in the request for legislative authority to negotiate barriers on services and investment and in the presentation of an interim "Data Declaration" draft to OECD.

Much more is necessary. First, a work plan needs to be devised and accepted in GATT for moving steadily and surely toward the codes that may guide trade in information services. Second, statesmanship of a high order is required for pointing the way toward the consensus that is essential if fundamental differences on the role of government in services industries are to be bridged.

There is little consensus today on any of the services trade. Strong objections exist for even taking up some services. Some services — in particular, telecommunication and economic information services -- are activities in which traditions of government intervention are long and deeply held. Areas such as information technology are unfamiliar territory that will have to be tracked and plotted before the negotiations can be seriously tackled. Reaching a consensus will be a long and arduous task. A first stage work plan designed to work together towards a common approach might be more productive than one based on preconceived notions of what the service codes should cover.

The U.S. has made important progress during 1981-82 in formulating work plans for the GATT discussions. It has had less success in creating the sense of political commitment that might persuade other GATT members that a genuine consensus is possible. To the contrary, a number of U.S. actions have created contradictory impressions about the depth of political commitment. U.S. actions restricting the free flow of economic information in the form of technological data have seemed contrary of U.S. intentions as expressed, for example, in the draft "Data Declaration."[3] A first order of business is to end the uncertainty about the political priority that the U.S. is prepared to give to the GATT negotiations. Talking about the entire sweep of GATT issues, Harald Malmgren has urged that in approaching the negotiations "we need to have a new look at our own policies and institutional framework first."[4] This perception, coming from one who has gone through the exercise before, should be heeded.

A fresh look and clearer definition of U.S. priorities may be necessary for success in these negotiations. It is particularly important for the government, the business community, and the general public to debate what barriers and controls on information flows the U.S. would want to retain for political reasons, and to assess the importance of these controls in relation to the economic and political costs of the barriers and controls that other nations will wish to retain. Without a consistent U.S. political commitment the services round may flounder or get lost in the hail of political charges and countercharges. In the ensuing international environment, trends toward a national regulatory regime over information flows are likely to flourish.

B. Can Access Reciprocity Work In Free Trade Diplomacy?

Access reciprocity is a potentially useful diplomatic tool for confronting the growing inclination toward restrictive regulations on information technology trade. It can be used more effectively than in the past. There are risks in employing the policy. Access reciprocity can create serious repercussions when it serves as a vehicle for escalating a modest restriction into costly retaliatory conflict, turning it into boomerang reciprocity. Across the board legislation would almost certainly mandate boomerang reciprocity. Properly employed as a diplomatic tool, this can be avoided.

The policy might have greatest value as an instrument for deterrence in a broad diplomatic strategy that looks to multilateral standards of reciprocity, rather than as an agent of retaliation in specific circumstances. Access reciprocity might be used most successfully where formal bilateral agreements have been established for dealing with information issues. Bilateral channels provide useful means for discussing specific problems and technical issues with individual nations. These discussions are generally resolved not on the merits alone of the dispute, but in the context of diplomatic leverage that each side brings to bear on the dispute. So far the U.S. has not set up specific bilateral channels for information and communication issues. Existing trade channels have been used on occasion, or ad hoc meetings have been held. For all of these forms of diplomatic contact, an announced policy of access reciprocity could add important leverage.

C. How Can the U.S. Compete with Japanese Technological Proficiency?

The Japanese challenge to U.S. technological leadership may be a matter of concern to the entire world, not to the U.S. alone. If the challenge represented only the increasing proficiency in Japanese commercial technology, the contest could be seen as an exercise in technological virility. But the Japanese challenge may also represent declining U.S. corporate proficiency and faltering attention to the fundamental research and development that has been the energizing source of U.S. technological advance. Even Japanese corporations might benefit from a U.S. reawakening.

Japanese success in high technology commerce is a reflection of the propensity of the Japanese system to concentrate its energies and resources on specific commercial objectives. An effective U.S. response seems necessary. But replication of the Japanese system, which embodies cultural and political values uniquely Japanese, and excludes values that are uniquely American, is neither practical nor desirable. An effective response, however, could be directed at what the Japanese system accomplishes.

What the Japanese system accomplishes is a blending of the forces of private corporations and the Japanese government in a consensus that permits the individual corporation to retain its separate strength in implementing a coherent common strategy. The consensus is not a "Japan Incorporated" decision. It is much more a consequence of the minimal adversary tradition that permeates the formal institutional structure in the Japanese government, a tradition that provides the right atmosphere for bringing the consensus about and making it work.

Doubt has become widespread that the American corporate system can answer the Japanese challenge without more dependable cooperation between the federal government and private corporations. Dr. Frank Press, the President of the National Academy of Sciences, has called a "partnership between government and industry in research and development" the essential beginning of a "successful industrial policy in this kind of competition."[5] The search for a better formula for the government-industry dialogue on industrial technology policy may be one of the most critical questions for public policy in the 1980s. Overcoming the traditional adversary relationship in the dialogue is one of the principal problems in establising any government-industry partnership.

D. Can Market Competition Answer Third World Requirements?

Information trade competition for LDC markets is best described as a cat and mouse game with two cats and a mouse that is turning into a cat. Most LDCs see themselves as aspiring suppliers of information technology goods and services and frame investment and development policies with this in mind. Competition for these markets is likely to become sharper. The Third World is where economic growth is greatest and where information technology growth is expected to be very lively.

This is a situation where natural economic forces -- if they are allowed to function -- can provide an answer. A development cycle could be expected that would bring Third World nations gradually into an information age having a genuinely free and balanced flow of information.

Rising information technology exports to the Third World could provide a balancing offset in the patterns of world trade, enabling the advanced industrialized nations to buy up the rising output of the middle technology

industries of the Third World. In principle this should provide a neat formula for the advanced nations to shift their work forces from traditional to high technology production, while facilitating the industrializing strategies of the developing countries in shifting work forces from primary and labor intensive production to traditional and medium technology industries. In practice the outcome may be different.

There are two points where the cycle formula is most likely to go wrong. The first is where policy in the industrialized nations falters in moving workers out of traditional industries. This is likely, for example, when they are faced with chronic unemployment and are subsidizing troubled traditional industries. The second is where policy in Third World nations shows excessive impatience for a domestic information technology capability. When this happens the LDC is likely to turn to restrictive policies long before it has the capability to stand on its own.

These imperfections could cause major difficulty even in settled times. Two impending events in the 1980s may accentuate the practical imperfections of the cycle formula. The deepening recession in the industrialized world could materially slow movement out of traditional industries and stimulate protective moves to save jobs in traditional employments. This in turn could lessen the earnings from the Third World industrial exports, thereby leading to diminished demand for imports of information technology goods and services. The other impending event is the demand of the New World Information Order which could over-accelerate the development cycle of information technology in the Third World, thereby placing additional strains on advanced nations to accommodate Third World industrializing strategies.

A North-South commitment to this development cycle would go a long way toward neutralizing its imperfections. Even in the absence of a general international commitment, unilateral U.S. action could facilitate the cycle while serving its own interests. Increasing U.S. exports of information technology goods and services to Third World markets would create jobs, making domestic adjustments to rising Third World industrialization easier. In these markets, finance and credit are often as crucial as the technology. Low interest export financing and mixed credits using assistance funds for communication and information technology development are the way Japan, France, Germany, and other European nations are competing for this trade. The U.S. has not provided mixed commercial and assistance financing in the past, though this use of AID and Export Import Bank finance could sharpen U.S. competitiveness in the Third World. Allocating additional Export-Import Bank financing for communication and information technology sales, as well as other forms of encouraging private marketing of U.S. information products and services, might also help.

Such an approach might do more than improve the U.S. commercial position in the Third World markets. It could provide additional leverage for discouraging the erection of barriers to trade and information flows. It might even provide a more palatable answer to Third World demands for a New World Information Order.

E. How Should the U.S. Deal with Global Information Technology Issues?

This study has concentrated on commercial trade in information goods and services. But information technology trade takes place in a context of other international information issues concerning vital U.S. interests, including international security, defense, scientific advance, technology

transfer, and freedom of the press. How the U.S. deals with the broader global issues of information technology may well be the predominant factor in determining the future of U.S. competitive strength in information technology trade. Corporate heads, trade union leaders, university and research directors who fail to recognize the importance of the broad global interests may end up serving badly their own narrow interests.

No other nation has paid attention longer than the U.S. to the social and economic implications of computer and information technology advances. Many issues that are current elsewhere were resolved a decade ago in the U.S. But the U.S. focus has been inward; few nations have given less attention to the international implications.

Yet American industry has thrived on its external markets. American information technology producers and multinationals need open international information markets if they are to exercise their full competitive strengths. Serious consideration of the international issues may be an essential step in preserving these open institutions. If international unrest over the "information imbalance" that is perceived by other nations grows and resolute action is taken to correct the imbalance, the open international system could be dangerously undermined and the U.S. competitive strength along with it.

Preoccupation with balances in information technology reflects fears that the disparities mean permanent economic inferiority and signify cultural and political subservience as well. Philippe de Seynes has spoken of the danger that Third World nations face: "They may become deserts . . . through exclusion from the communication club."[6] The Executive Secretary for Informatics in Brazil, Joubert de Oliveira Brizeda, has put the information technology issue in three pertinent questions:[7]

> How are we to administer the informatization process vis à vis the present day explosion of informatics?
> How are we to keep this explosive growth from becoming the means for the aggravation of the differences among the nations and social categories?
> Will it not only deepen the economic, social and technological gaps that are already so vast?

Are these valid fears? Are they politically motivated, advanced as emotive support for unrealistic economic demands? Or do they reflect genuine apprehensions expressed in emotionally colored terms?

An answer has been suggested by John Rankine of the International Business Machine Corporation.[8] Rankine testified to a congressional investigation on data flows that "the new technology makes possible the rapid exchange of enormous quantities of information over substantial distances. This has resulted in new dimensions for international information flow and is causing an increased focus by countries around the world on the social, economic, and political implications of the subject." Rankine commented on the emphasis that is often placed on theoretical evils that might result "under some remotely imaginable circumstances." But, he concluded, "our position is that it is entirely possible to balance valid concerns of national authorities in all these areas with the requirements of the arts, science, media and commerce for the free flow of information across national boundaries".[9]

Peter Robinson, who has been in the forefront of the evolution of Canadian thinking, stated similar thought in May, 1982. "The use of TDF can influence the effectiveness of national laws," Robinson said, "but this does not necessarily mean -- as I once thought -- that this directly affects national sovereignty. . . Growing interdependence among nations will require changes in legal approaches that do not necessarily involve a

derogation of sovereignty, even though placing certain constraints on it."[10]

There is a universality in these carefully thought out statements; growing applications of information technologies are upsetting domestic policy mechanisms everywhere; administrative and regulatory precedents are encountering the same upheavals as in the U.S.; the fears of other nations are genuine problems that can with reason be made into negotiable issues.

Is it in the interest of the United States to take the lead in charting a new and more reasoned course? The alternative may be continued confrontation and increasingly hostile challenges to institute a New World Information Order. "To define a framework of policies, designed to avoid such a dismal future," Phillippe de Seynes has counselled, "would appear one of the most urgent tasks for all those still hoping and groping for a global Grand Design."[11] A New World Information Order imposed in hostility and aimed at redressing wrongly perceived wrongs could leave the entire world worse off, aggravating the differences among nations that it would be intended to propitiate. A new framework that would balance valid concerns and correct reasonably perceived wrongs could, on the other hand, enable the entire world to benefit equitably in making the information age an age of enlightenment and liberty.

Appendix A: A Note on Terminology

In this study the term "information technology industry" is used to encompass the goods and services production of the computer and communications industries, plus the output of the related services trades associated with applications of computer and communication technologies in traditional industries. This terminology is used because of its value in describing international trade that is the consequence of technology advances in the information industry.

There are two important points to be noted in this usage. The first is the distinction between information goods and services production that is the result of low technology and which is the result of high technology. In practice the distinction could be difficult to identify, for example, in collecting data that would show quantitative measurements of activity resulting from high or low technology. The distinction can be made conceptually, even though it is not one that has been drawn up in measurements of national production that are currently being employed.

This distinction is justified because international trade in the high technology goods and services poses qualitatively and quantitatively different issues than trade in low technology information goods and services.

Second is the desirability to acknowledge the uncertain boundaries of a new industry that may well extend eventually into areas that have not generally been considered a part of the information technology industry. A somewhat ambiguous usage may be justified by the great and special impor-

tance that information technology applications are having in international trade. This usage permits inclusion in information technology trade -- it may be interesting to note -- those high technology applications in traditional information industries, such as commercial advertising and international press operations.

Appendix B: A Note on Statistical Collections of International Trade in Information Goods and Services

Statistical data cited in this study come from OECD publications or from the Department of Commerce. In some instances unpublished compilations have been available from the Department of Commerce. There are major shortcomings in the available data, deficiencies that are well known to these organizations. Both are trying, within their limited resources, to improve the data collections. Until this is satisfactorily accomplished efforts to understand and act on the issues of information technology trade will be seriously handicapped.

The Department of Commerce does not now publish a consistent series on information technology trade. The estimates of international trade in computers and telecommunications included in the Department's annual U.S. Industrial Outlook are quite valuable, and cover telecommunications services as well as products. The narrative also calls attention to market developments and innovations. The data are not detailed, however, and lack coverage of the computer service and data processing trade, as well as activity in ancillary user industries. The biggest gap is in data on information management.

The special publication by the Department's National Telecommunication and Information Administration, United States Trade in the Merchandise of Information Industries, is an excellent compilation of the available data on the 1972-78 period. The study, however, does not include data on any of the services trades. It does include, on the other hand, data on a wide range of information products, embracing both low and high technology

merchandise without satisfactorily distinguishing between products within this important criterion.

The difficulties that are evident in this study are easy to identify, as, indeed, its authors have acknowledged. The biggest gap in information technology data, and the most obstinate to deal with, is in the services trade. Many of the services are new and have not been covered in conventional data collections. Several services -- such as those in business information systems -- may not be recorded by the concerned private company in a way that can be covered in conventional data collection effort.

While unpublished materials of the Department of Commerce have included estimates of some elements of services trade, no systematic collections that could feed a comprehensive series have been made. Data on services trade that are collected -- for example, by the Federal Communications Commission and NTIA -- are incorporated in larger aggregates. To understand and correct the deficiency -- which is applicable to many other areas of services trade as well-- the Department of Commerce, in conjunction with the U.S. Trade Representative and the Department of State, commissioned a study on International Operations of U.S. Service Industries: Current Data Collection and Analysis. The study identified many of the gaps and shortcomings in all service areas, including information technologies, and pointed to possible remedies. The study also concluded that services earnings were much larger than had been commonly assumed and were rising rapidly.

Because of the growing interest in services trade and the expanding role of services in the national economy, official efforts to improve data collections have been stepped up. Evidence of interest may be seen in

legislative bills calling for a services industry development program in the Department of Commerce and higher priority for data collection.

Actually, many trade associations and some trade publications have been active collectors of data on information technology services. Useful data have been collected, for example, by ADAPSO, CBEMA, the American Bankers Association, and the Electronic Industries Association, and by Datamation, the International Data Corporation, Arthur D. Little, and McGraw-Hill. These data are valuable even though they represent relatively narrow segments of the trade and are collected on differing technical and evaluation standards. Such data collections could provide a valuable base for systematic and comprehensive data collections as input for formal series publication in the United States.

Internationally, data collections have the same weaknesses that are found in the United States -- perhaps more so. Comparisons between nations are difficult and cannot be made with the desired confidence, primarily because of differences from one country to the next in definitions and concepts. Many of these differences have been lessened or reconciled in technical bodies of the United Nations organization and in OECD. Comparable series data are available on a large part of trade in physical goods. In services trade, however, little progress has been made.

OECD has tried for several years to improve collections of data in the information industries, though its efforts generally have been assigned a low priority. The program has focussed primarily on the use of domestic information resources, but has covered international trade and investment as well. The objective of the OECD program has been to provide data that are internationally comparable through (a) more precise definitions of data that should be collected, (b) more active national collection efforts, and

(c) harmonized definitions and concepts that would minimize international differences, or at least reconcile them.

The OECD program is patterened on a similar ongoing effort to harmonize international collections of data on research and development. The R&D program has produced an influential guide, the Frascati Manual, which outlines procedures and definitions that have been accepted by national authorities acting on a technical level. The Frascati Manual is periodically updated and is employed as an OECD-wide model for collection and publication of R&D data. It also has been used as a model for setting data collection standards in the UN and some of its regional bodies. Although OECD does not have a specific plan for producing an information technology data guide, it is possible that a statistical collection manual could have a similar widespread utility beyond its original purpose.

Until more statisfactory data collections are available, analysis of the international impact of information technology will be seriously handicapped, and policy decisions both in the U.S. and elsewhere will be based on estimates that cannot be substantiated with the degree of confidence that the gravity of the issues would seem to warrant. It will be difficult, for example, to give a wholly satisfactory interpretation to the concern that the United Nations Centre for Transnational Enterprises has expressed about "the emergence of a new set of imbalances between the developed and developing countries."[1] A hypothetical model could be constructed, based on the production cycle theory, that would be consistent with factual perceptions of imbalance in North-South trade as well as with continued technological advances in information technology trade of the developing countries. In the absence of clarifying evidence it would not be possible to substantiate or refute this model, through its substantia-

tion or refutation would be highly relevant to policymaking in both developing and developed nations. Thus, until the statistical data on information technology trade, especially in the services areas, are greatly improved, the depth and meanings of the most important issues are going to be veiled by an undesirable obscurity.

NOTES*

I. The Foundations of American Competitive Strength

1.1. Turn, Rein (ed.). Transborder Data Flows: Concerns in Privacy Protection and Free Flow of Information, American Federation of Information Processing Societies, Inc., Arlington, Va., 1979, p. 44.

1.2. McCaffrey, Seligman, and Von Simson, Inc. Impact of Transborder Data Flow Legislation: Corporate Case Studies, New York, 1979, pp. 38-47. Limited circulation.

1.3. Turn, supra note 3, pp. 37-42.
See also Office of Technology Assessment. Computer Based National Information Systems, U.S. Government Printing Office, Washington, D.C., 1981.

1.4. Bell, Daniel. "The Future World Disorder," Foreign Policy, Summer 1977, pp. 109-133.

1.5. Thurow, Lester. "The Moral Equivalent of Defeat," Foreign Policy, Spring 1981, pp. 114-134.

1.6. Thurow, Lester. The Economist, January 31, 1982.

1.7. Bylinsky, Gene. "Japan's Ominous Chip Victory," Fortune, December 14, 1981, pp. 52-57.

1.8. Ouchi, William G. Theory Z, Addison-Wesley, Reading, Mass., 1981.

1.9. Hayes, Robert H. and William J. Abernathy. "Managing Our Way to Economic Decline," Harvard Business Review, July-August 1980, pp. 67-77.

1.10. Ibid. pp. 193-99.

1.11. Mansfield, Edwin. "International Technology Transfer: Rates, Benefits, Costs and Public Policy," paper prepared for presentation at the Annual Meeting of the American Economic Association, Washington, D.C., December 1981.

1.12. Ibid.

1.13. Johnson, Harry G. "Technological Change and Comparative Advantage," Journal of World Trade Law, January-February 1975.

---

* Several documents used in preparing this study are not in general circulation and may not be available in reference libraries. Readers who wish to refer to these documents should contact the author through the Harvard Center for Information Policy Research.

1.14. Baranson, Jack. "Technology Exports Can Hurt US," Foreign Policy, Winter 1977, pp. 180-194.

1.15. See, for example, U.S. Tariff Commission. "Implications of Multinational Firms for World Trade and Investment and for U.S. Trade and Labor," a report to the Senate Finance Committee, 1973. See also Kirkland, Lane et al. "Labor's International Role," Foreign Policy, Spring 1977, pp. 204-245.

1.16. Mansfield, supra note 13.

1.17. U.S. Department of Labor. "Report of the President on U.S. Competitiveness," Washington, D.C., 1980.

1.18. Computer and Business Equipment Manufacturers Association. "Trade and National Security," Washington, D.C., February 1981.

1.19. Hartland-Thunberg, Penelope and Morris H. Crawford. Government Support For Exports, Lexington Books, D.C. Heath and Company, Lexington, Massachusetts, 1982.

1.20. Hartland-Thunberg, Penelope. "Successful Economic Revitalization Requires Export Oriented Program," Journal of Commerce, August 11, 1981.

1.21. Frohman, Alan L. "Technology as a Competitive Weapon," Harvard Business Review, January-February 1982, pp. 97-104.

1.22. Estimates of the National Science Foundation as quoted in AAAS Report VII, 1981, p. 99.

1.23. Ibid., p. 119.

1.24. See supra note 17.

1.25. Bucy, J. Fred. "Controlling Exports of Technology," International Security, Winter 1981.

1.26. Reich, Robert. "High Tech Rivalry," New York Times, November 20, 1981.

1.27. Baldrige, Malcolm. Testimony before the Senate Interstate and Foreign Commerce Committee, reported in The Washington Post, May 15, 1982.

1.28. Greenberg, Daniel S., "A New Surge of Money For Research in U.S.," Journal of Commerce, July 15, 1982.

1.29. American Association for the Advancement of Science, Research and Development, AAAS Report VII: Federal Budget, FY 1983, American Association for the Advancement of Science, Washington, D.C., 1982.

1.30. Ibid.

1.31. Department of Defense, The FY 1983 Department of Defense Program For Research, Development, and Acquisition. Statement to the 97th Congress, Second Session, 1982. Department of Defense, Washington, D.C., 1982.

1.32. See supra note 28.

1.33. See supra note 28.

1.34. Centre on Transnational Corporations, Report of the Secretariat. "Transnational Corporations and Transborder Data Flows: An Overview," United Nations Economic and Social Council, New York, 1981, p. 4.

1.35. Giraud, Andre. Opening Address, OECD High Level Conference, OECD, Paris, October 1980. Published in Information, Computers and Communications Policies for the 1980s. Proceedings of the High Level Conference, edited by Hans Peter Gassman, North Holland, Amsterdam, 1981.

1.36. Dalfen, Charles M. Address before the IBI World Conference, Rome, 1980. See also Final Proceedings: World Conference on Transborder Data Flow Policies, Conference Documents, Intergovernmental Bureau for Informatics, Rome, 1980.

II. Responding to the American Lead in Information Technology

2.1. This account of competition in computer trade relies heavily on the OECD studies entitled Computer and Data Processing Industry and Technical Change and Economic Policy: The Electronic Industry and on Russell Pipe, Towards Central Government Computer Policies, OECD, Paris, 1973. The first was written in 1977 by Professor A. Michalet and Mr. Michel Delapierre of the University of Paris and reviewed and approved by OECD committees on multinational enterprises and on computer communications. The second was written in 1980 by the OECD Secretariat on the basis of an OECD-wide survey and reviewed and approved by the Special Experts Group chaired by Mr. B. Delapalme, president of the "Million à l'Innovation" in France. The third is a background report written for the OECD Informatics Studies series.

2.2. Ibid., Computer and Data Processing Industry, p. 90.

2.3. Ibid., p. 175.

2.4. Ibid.

2.5. Ibid.

2.6. Ibid.

2.7. Datamation, December 1981.

2.8. Computer and Data Processing Industry, supra note 1, p. 169.

2.9. Datamation, supra note 7.

2.10 The Electronic Industry, supra note 1.

2.11. See, for example, "Telecommunications, The Born Again Technology," The Economist, August 22, 1981.

2.12. Ramsey, Thomas J. "Europe Responds to the Challenge of the New Information Technologies." Cornell International Law Journal, Volume 14, No. 2, Summer 1981, pp. 237-287.

2.13. Ibid.

2.14. "A Yen Too Cheap," The Economist, March 20, 1982.

2.15. Hartland-Thunberg, Penelope, "Value of Yen Fuels U.S.-Japan Gap," Los Angeles Times, April 29, 1982.

2.16. "Growth of Electronics Market In Europe Seen Benefitting Japan," The New York Times, November 11, 1980.

2.17. "Can The U.S. Recapture Its Japanese Market?", Business Week, August 25, 1980.

2.18. Hadley, Eleanor, Japan's Export Competitiveness In Third World Markets, Center for Strategic and International Studies, Georgetown University, Washington, D.C., 1981.

2.19. See Ganley, Oswald H. and Gladys D. Ganley. International Implications of United States Communications and Information Resources, Cambridge, 1981 (manuscript of forthcoming book). An excellent summarization of the role of INTELSAT in the development of international satellite communications.

2.20. Financial Times (London), January 25, 1981, describes at length the contracting arrangements for the 15 systems to be built in 1981-82 of the INTELSAT V, the fifth generation of commercial communication satellites.

2.21. Schwarz, Michael. "The Politics of European Space Collaboration," Intermedia, July 1981, pp. 66-71.

2.22. Ibid.

2.23. Ibid.

2.24. Derieux, Charles. "France Moves Toward New Services," Intermedia, July 1981, p. 48.

2.25. The New York Times, November 25, 1981.

2.26. Muller, Albert. "Commercial Satellites May Threaten West Germany's Media Mix," Intermedia, July 1981, p. 51.

2.27. Dunn, Donald A. "National and International Policy Issues in Computer-Communications," ICCC-78 Conference, Kyoto, Japan, 1978.

2.28. Larsson, T. "The Allocation of Resources for Computers and Tele-Communications," OECD Conference on Computer-Telecommunication Policies, Paris, 1971, pp. 141-163.

2.29. Gill, S. "The Allocation of Resources for Computers and Telecommunications," OECD Conference on Computer-Telecommunication Policies, Paris, 1976, pp. 185-230.

2.30. Logica Limited. The Usage of International Data Networks in Europe, OECD, Paris, 1979, p. 52.
Japan Information Processing Development Center. Computer White Paper, Tokyo, 1980.

2.31. Hauff, Volker (Secretary of State, Federal Ministry of Research and Technology). Address at OECD Conference on Computer-Telecommunication Policies, Paris, 1976, pp. 29-37. See supra note 1.35.

2.32. Logica Limited, supra note 22, p. 55.

2.33. Kimbel, Dieter. Computers and Telecommunications, OECD, Paris, 1973. Also Computer White Paper, supra note 22.

2.34. Gill, supra note 32, p. 195.

2.35. Ibid, p. 196.

2.36. Benedetti, Marino, "The Growth of Data Communications in Western Europe," IBI World Conference, Rome, 1980.

2.37 Logica was the contractor for both studies, EURODATA '79, commissioned by CEPT, and The Usage of International Data Networks in Europe, commissioned by OECD.

2.38. Benedetti, Marino. Article in Telecommunication Journal, January 1981.

2.39. Larsson, supra note 20, p. 29.

2.40. Gill, supra note 21.

2.41. Chamoux, Jean-Pierre. Preliminary Study on Data Transmissions Tariffs in Europe and North America, OECD, Paris, 1978.

2.42. "Toward the Wired Society," World Business Weekly, June 8, 1981.

2.43. Kuitenbrouwer, Frank. "PTT Review Set in the Netherlands," Transnational Data Report, July-August 1981.

2.44. The Economist, supra note 11, p. 20.

2.45. See supra note 1.19, pp. 37-54 for an analysis of the "second strike" technology strategy.

2.46. Greenberg, Daniel S., "France Aims To Emulate Japanese Industrial Boom," Journal of Commerce, August 31, 1981; Science and Government Report, January 15, 1982; "Seeking Technological Gains, The French Socialize Science," The New York Times, August 15, 1982.

2.47. United Nations Commission on Transnational Corporations, Transborder Data Flows and Brazil: A Case Study. United Nations Commission on Transnational Corporations, New York, 1982.

2.48. See supra note 1.19, pp. 48-49.

2.49. Ibid.

2.50. Bortnick, Jane, "International Information Flow: The Developing World Perspective." Cornell International Law Journal, supra note 2.12, pp. 333-353.

2.51. See supra note 1.33.

2.52. United Nations Commission on Transnational Corporations. The Role of Transnational Corporations In Transborder Data Flows: Access To the International On-Line Data-Base Market. United Nations Commission on Transnational Corporations, New York, July 10, 1982.

III. International Contention Over Rules for Information Technology Trade

3.1. Blumenthal, W. Michael. Address at the National Computer Conference, Chicago, May 6, 1981.

3.2. "U.S. Seeks Trade Negotiations on Services," Transnational Data Report, July-August 1981.

3.3. For a lucid and logically presented analysis of the pro-regulatory position, see Jan Freese, International Data Flows, Lund, Sweden, 1978.

3.4. Nimetz, Matthew. Hearings of the Sub-Committee on Government Operations, March 2, 1980; in International Data Flows, House Committee on Government Operations, U.S. Government Printing Office, Washington, D.C., pp. 214-228.

3.5. Nimetz, Matthew. Keynote address address at the OECD High level Conference on Information, Computer and Communications Policy in the 1980s, Paris, October 6, 1980.

3.6. Brzezinski, Zbigniew. Address before Conference on Information and Society, Paris, September 6, 1979.

3.7. Department of Commerce. Text of Letter from Secretary Malcolm Baldrige to Major Multinational Corporations and Trade Associations, July 15, 1981, Washington, D.C.

3.8. Buckley, James. Testimony before a Sub-Committee of the House Committee on Foreign Affairs and before the House Committee on Government Operations, April 2, 1981.

3.9. Office of U.S. Trade Representative. International Trade Issues In Telecommunications, Data Processing and Information Services, Washington, D.C., 1981.

3.10. "Toward an Information Age Debate," Chronicle of International Communciations, April 1981. See also Oswald Ganley, The United States-Canadian Communications and Information Relationship, Program on Information Resources Policy, Harvard University, Cambridge, Mass., 1980. Also "Canadian Bank Act Protectionist?", Transnational Data Report, January-February 1982.

3.11. Ripper, Mario Dias and Jorge Luiz Cesario Wanderley. The Brazilian Computer and Communications Regulatory Environment and Transborder Data Flow Policy, IBI World Conference, Rome, June 1980. See supra note 1.36.

3.12. Nimetz, Matthew. Testimony before the House Sub-Committee of the Government Operations Committee, March 27, 1980, in International Data Flows, supra note 4. See also U.S. Trade Representative report supra note 9.

3.13. "Major Trade Issues in TDF," Transnational Data Report, July-August 1981. Also supra note 9.

3.14. House Committee on Government Operations. International Information Flow: Forging a New Framework, Washington, D.C., 1980.

3.15. Ibid.

3.16. Ibid.

3.17. See supra note 9.

3.18. Onstad, Philip. Testimony before the Sub-Committee of the House Committee on Government Operations, March 10, 1980, in International Data Flows, supra note 4, pp. 16-61.

3.19. International Information Flow, supra note 14.

3.20. International Information Flow, supra note 14, pp. 16-61, 72-76, 270.

3.21. Markoski, Joseph P., "Telecommunication Regulations," supra note 2.12.

3.22. "Toward an Information Age Debate," supra note 10.

3.23. Brock, William E. Statement before a Joint Oversight Hearing of the Senate Committee on Finance and the Committee on Banking, July 8, 1981, Washington, D.C.

3.24. The New York Times, January 19, 1982.

3.25. Armstrong, Willis. Comment during a meeting of the State Department Public Advisory Group on Transborder Data Flows, January 1, 1982.

3.26. Association of Data Processing Service Organizations, The Need for Reciprocity in International Telecommunications, Washington, D.C., 1981, reproduced in part in Markoski, supra note 2.12.

3.27. The Economist, March 13, 1982.

3.28. S. 2094, The Reciprocal Trade and Investment Act of 1982, Subcommittee on Trade, Senate Finance Committee.

3.29. The Washington Post, February 16, 1982.

3.30. See supra, note 1.28.

3.31. See Markoski, supra note 2.12.

3.32. Statement of William Brock before the Senate Finance Committee, March 24, 1982.

3.33. Scocozza, Anthony, Deputy Assistant Secretary of State. Testimony before the Subcommittee on Government Information and Individual Rights, Committee on Government Operations, House of Representatives, April 29, 1982.

3.34. The New York Times, June 17, 1982.

3.35. Ibid.

3.36. Wall Street Journal, July 21, 1982.

3.37. "You Scratch My Back, I Kick Yours," The Economist, March 13, 1982.

3.38. "CBEMA Backs Sen. Danforth's Trade Measure," CBEMA Comment, June 1982, published by the Computer and Business Equipment Manufacturers Association, Washington, D.C.

3.39. Giraud, André. Opening Address at the OECD High Level Conference, Paris, October 1980.

3.40. Ibid.

3.41. Freese, supra note 3.

3.42. Department of Communications, Government of Canada. Policy Implications of Transborder Data Flows, OECD, Paris, October 1980.

3.43. Ibid.

3.44. Ganley, supra note 10, p. 10.

3.45. Marchand, de Montigny. "The Impact of Information Technology on International Relations," Intermedia, November 1980.

3.46. Institute for Research on Public Policy. Issues in Canadian-U.S. Transborder Computer Data Flow, Montreal, Canada, August 1978.

3.47. Ibid.

3.48. Nimetz, supra note 12.

3.49. Bushkin, Arthur. "Transborder Data Flows: The Need for International Cooperation," Le Monde Diplomatique, Paris, November 1980.

3.50. Federal Communications Commission. "Second Notice of Inquiry Relating to Preparation For The ITU WARC Conferences," June 11, 1982.

3.51. USCCITT, National Committee. Minutes of Meeting of November 18, 1981. USCCITT, Videotex Technical Experts Panel. "Proposed VIDEOTEX Recommendations for a Unified Presentation Paper," July 8, 1982.

3.52. Proposal by the United States. Transborder Data Flow and Economic Activity, Washington, D.C., January 1981.

3.53. "OECD Distributes Questionnaire On TDF," Transnational Data Report, June 1982.

3.54. "OECD's Present Task Is To Identify TDF Problems and Benefits," Transnational Data Report, June 1982.

3.55. See supra note 9.

3.56. See supra note 9.

3.57. See supra note 9.

3.58. Department of State, Working Group on Transborder Data Flows, Advisory Committee on International Investment, Technology, and Investment, Minutes of Meeting of March 23, 1982. Department of State, Cable Report on ICCP Meeting of March 30-April 1, 1982.

3.59. Ibid.

3.60. U.S. Trade Representative. Inventory of Selected Impediments To Trade In Services. U.S. Trade Representative, Executive Office of The President, Washington, D.C., 1981.

3.61. Legal Issues Related To Transborder Data Flows. OECD, Paris, May 1981.

3.62. See supra note 58. Minutes of Meeting on September 10, 1981.

3.63. U.S. State Department. Cable Report on Meeting of OECD Experts Group on Transborder Data Flows, Paris, June 22-23, 1981.

3.64. Mansfield, Edwin. See supra note 1.11.

3.65. Preliminary Investigation of Transborder Data Flows of Japan. Ministry of Posts and Telecommunications, Tokyo, 1981.

3.66. Ibid.

3.67. Antonelli, A. Transborder Data Flows and International Business. OECD, Paris, June 1981.

3.68. International Chamber of Commerce. Issues of Computing, Telecommunications and Information Policy. International Chamber of Commerce, Paris, 1981.

IV. Five Questions on Future of Trade in Information Technology

4.1. For an analysis of the political-economic content of the ITU conferences see the author's "The U.S. Mobilizes for WARD: But Bickers over Political Aims," in the Transnational Data Report, September, 1982.

4.2. The informal paper prepared by the Under Secretary of State "International Aspects of Communication and Information" is an articulate summary of the foundations of U.S. policy. Written as an informal analysis "to help stimulate discussion," the study bases specific trade policy "suggestions" on the liberal trade principles embodied in GATT and OECD. Transnational Data Report of April-May, 1982 and the Chronicle of International Communications of March, 1982 contain summaries of this study.

4.3. The operational portion of the U.S. draft "Data Declaration states that Governments of OECD member countries
"Declare their determination, in light of the foregoing:
A) To maintain and improve an open system of international information flows;
B) To avoid restrictive measures which would disrupt the international flow of data; impede international trade in telecommunications, data processing and information services; and inhibit economic growth, productivity, and technological innovation;

C) To continue efforts to consult with each other on issues covered by this Declaration in order to further the achievement of its objectives."

4.4. Malmgren, Harald B., "An Agenda for the 1980's." Statement submitted to the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives, December 15, 1981.

4.5. Press, Frank, "Remarks To The National Press Club, July 20, 1982." National Academy of Sciences, Washington, D.C. August, 1982.

4.6. de Seynes, Philippe. "The Relevance of Future Movements." In Intermedia, January 1981, pp. 20-26.

4.7. de Oliveira Brizeda, Joubert. Opening address before the IBI World Conference on Transborder Data Flows.

4.8. Rankine, John. Testimony before the House Subcommittee on Government Operations, March 10, 1982. See supra note 3.4, pp. 2-11.

4.9. Ibid., p. 4.

4.10. Excerpt from a speech at Queens University, Kingston, Canada, in Transnational Data Report, June, 1982.

4.11. de Seynes, supra note 6, p. 26.

Appendix B: A Note on Statistical Collections of International Trade in Information Goods and Services

B.1. United Nations, Economic and Social Council, Commission on Transnational Corporations. Transnational Corporations and Transborder Data Flows: An Overview, E/C 10/87, July 6, 1981, New York, p. 5.