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INFORMATION TRANSFER BETWEEN THE U.S. AND DEVELOPING COUNTRIES:
AN ASSESSMENT AND SUGGESTIONS

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I. Introduction

In recent years the developing countries have been intensifying efforts to induce the industrialized countries to provide them with the knowledge necessary to advance their social and, particularly, their economic development. These persuasive efforts are being orchestrated internationally by the UN family and catalyzed by other organizations, both governmental (such as the Intergovernmental Bureau for Informatics) and non-governmental (such as the International Council of Scientific Unions, and the International Federation for Documentation). Some of the prime time of the forthcoming UN Conference on Science and Technology for Development will be devoted to this subject.

These efforts represent a significant shift from the traditional international preoccupation with communication in science, in that their explicit objective is the acquisition of knowledge appropriate to the planning and development of national economies. A major characteristic of this shift is emphasis on non-traditional information and information services -- information that falls into the category of proprietary and experiential knowledge.

The timing of these efforts coincides with the increased awareness in industrialized countries that the latter categories of knowledge have an above par value, higher than the cost usually assigned to science and information. The next few years are thus likely to see a dialectic and economic sparring between the developing and the industrialized countries, and within each of these two groups, aimed at accommodating their respective interests. It is incumbent upon the United States to prepare for this process by rationalizing its position and developing suggestions for policy alternatives.

This paper is an interpretative summary of a study¹ the International Institute for Science and Technology made on behalf of the U.S. Agency for International Development. The purpose of the paper is to provide the U.S. delegation to UNCSTD with a capping discussion of relevant issues. It begins with an analytical summary of the developing countries' perceptions of the information transfer issue, followed by a review of the capacity of the United States to provide the information services desired by those countries.

¹Slamecka, V., ed., Scientific and Technical Information Services for Socioeconomic Development. Washington, D.C., International Science and Technology Institute, 1979.

Subsequently, a long-term U.S. posture is suggested. The final section of the paper highlights several issues of significance to the formulation of U.S. policy in this area.

II. Summary of Views of Developing Countries

This section recapitulates the findings of an analytical survey² of the literature emanating from developing countries and development-oriented international organizations and from preparatory documentation for UNCSTD, and dealing with their perception of the needs for information in relation to social and economic development.

The major themes that emerge from this analysis are the following:

1. A need for information related to "appropriate" technology;
2. A need for policy-relevant, decision-making, and business information;
3. A desire for more extensive development and deployment of international information networks, and for making the developing countries an equal party in the development of such networks;
4. A need for assistance in building necessary information infrastructures, particularly as regards education and training of information professionals;
5. A desire for a greater utilization of information technology in information handling;
6. Emphasis on regional approaches to provision of scientific and technical information, and strengthening of links between the developing countries themselves.

The developing countries' perceptions of need for information clearly differ with the level of their social and economic development. A major point of importance in information transfer arises with respect to the kinds and forms of knowledge that developing countries consider useful in socio-economic development. The utility of the traditional information resource — the recorded primary literature of science and technology — is said to be

²Saracevic, T., "Perception of the Needs for Scientific and Technical Information in Less Developed Countries." In: Slamecka, V., op. cit.

very low at the lowest level of economic development: the degree of its utility is seen as corresponding to the degree of industrialization. Policy-making and business information regarding technology applications has the highest value and applicability.

A second major point brought out by this analysis suggests that the developing countries' problem solvers are in various degrees of need for additional post-processing of primary and secondary information, to make it conform to the problem-solving process and to the level of problem difficulty. The function of this interpretative processing is to analyze and evaluate data and information from the viewpoint of a specific problem situation, and to present it in a form that makes minimum demand on the user. In many instances a need has been expressed for repackaging information services, and for information specifically prepared or assembled for given problems or classes of problem solvers. This perception of information service thus includes elements of what in industrialized countries are normally viewed to be functions of problem solvers, not information services.

As regards information services, the developing countries tend to have the following general expectations of the United States:

1. Easier access to U.S. based information and information systems, particularly to hard-to-get policy-making, business and proprietary information;
2. Greater U.S. involvement in and contribution to international and regional information systems and networks operated by intergovernmental organizations;
3. Easier access to information technology and assistance in its application for information work, particularly in the areas of software development and training;
4. More opportunities for direct exchanges of information professionals between the developing countries and the U.S.;
5. Assistance in building national information systems, especially in education and training of information professionals in developing countries;
6. Assistance with costs of information acquisition.

There seems to be little awareness of details concerning U.S. information resources, although there is a high recognition of the U.S. as the prime

supplier of information and its services. No appreciable discussion has been found of economic aspects related to information activities in general; and there seems to be a lack of awareness of the economics of information in the U.S., including the role of the private sector of the U.S. information economy.

III. Availability of U.S. Information for Development

Granting that the United States is the world's foremost processor of scientific and technical information, it is nevertheless appropriate to ask to what extent is the U.S. able to meet the information needs and requirements perceived by developing countries. McCarn³ has distinguished and described three categories of information resources and services in the United States: 1) those providing direct access to the scientific and technical literature (primary services); 2) those reassembling data and information and providing responses from appropriate data bases (secondary services); and 3) those providing expert and analytical assistance in response to specific questions and problems (tertiary services). This categorization responds roughly to the different levels of information need for development.

Primary Services

The United States processes about 80 percent of the world's primary scientific and technical literature, by collecting, abstracting and/or indexing the literature and providing access to compilations of abstracts and/or indexes and to collections of the original literature. In 1977, major U.S. indexing and abstracting services (comprised of about 25 non-government and 10 government organizations) processed about 2.5 million bibliographic items; their coverage has doubled over a 12-year period. These organizations produce printed indexes to the literature in their areas of expertise, as well as machine-readable data bases of the same information;⁴ the latter are leased or sold to several

³McCarn, D.B. "United States Information Resources and Services." In: Slamecka, V., op. cit.

⁴In 1977, over 50 million bibliographic references to scientific and technical literature and 5 million monographs were accessible for on-line computer searching in the U.S. These references are contained in nearly 300 bibliographic databases that are accessible commercially or publicly. About 25 percent of the records in these databases are produced by the government sector.

large organizations which in turn provide information retrieval services from these databases.

Information services are provided in two modes: on-line (in which the user or his/her agent — called an intermediary — interacts directly with the data base from a remote computer terminal), and batch (in which the database is searched against a fixed query automatically by the computer, and the output is forwarded to a user or selectively disseminated among specified users). On-line searching in the U.S. grows at a rate of 40 percent per year; it is estimated that in 1977 some two million searches were made. Batch services, marketed by the major on-line bibliographic search services and some of the database producers, search against only the new material being input into a bibliographic database and hence are more economical than the on-line retrospective searches.⁵

Copies of the literature identified through the use of an index or on-line service are generally provided by libraries (there are over 11,600 university, special and medical libraries in the U.S.). Many libraries offer document delivery services on an international basis, accepting requests by mail, telephone, TWX or TELEX. Alternatively, users can order documents on-line from seven major services including the Congressional Information Service (a private organization) for U.S. government documents, and the National Technical Information Service (a public organization) for government-sponsored technical reports). In most cases, special arrangements must be made, including setting up a deposit account with the organization from which documents are ordered.

The United States provides the best organized and most comprehensive access to the world's primary, public-domain literature of science and technology: monographs, journals, U.S. technical reports, patents, dissertations, and other forms of documents. The time lag between the appearance of the original document and its inclusion in the primary services varies; however, two to nine months is the range that covers the greater majority of documents.

⁵The services mentioned provide access to journal, report or special literatures. The best sources for locating information on the availability of monographic (book) literature are the United States Library of Congress Union List and List of Supplemental Locations, and the files of OCLC, Inc. The latter is the largest service in the world to provide on-line cataloging for over 1,650 libraries in the United States. As a byproduct of this activity, the files of the OCLC contain information on the location of all books cataloged.

Meaningful steps are being taken by the U.S. government to provide access to these resources by the developing countries. For example, the U.S. Agency for International Development provides on-demand document delivery of AID generated materials to developing countries; again, its agreement with the National Technical Information Service not only opens access to U.S. technical reports but also provides developing countries with assistance in the establishment of elements of their information infrastructures.

Secondary Services

Secondary information services provide direct answers to questions (rather than locations of answers). These services assemble information on specific subjects, usually from the original literature, and produce it in appropriate forms such as handbooks and computer databases.⁶ The latter are produced by a wide range of organizations including trade, industrial, professional, and scientific organizations, information centers of government agencies, information analysis centers, and independent research and development organizations.

While many numeric databases are of use in scientific research, decision makers in developing countries should find of much interest the wide and growing roster of numeric files serving agriculture, business, economics, energy, engineering, environment, forestry, medicine and health care, meteorology, metals, petroleum, shipping, and wood products. Typically, these databases are accessible on-line. Many databanks produced outside the U.S. are also available here.

On-line use of both bibliographic and numeric databanks requires a certain amount of skill and familiarity with the databank content, and users not having one or the other usually employ the services of intermediaries. This holds for problem solvers from developing countries for one other important reason — the lack of communication facilities, or their high cost. For practical purposes, developing countries can so far use these resources only indirectly, through intermediaries located in the U.S.

⁶Information or data compilations may cover a set of products in a specific area such as characteristics of electronic equipment; manufacturing products and methods such as the machinability of metals; standards and norms such as governmental or professional society specifications; statistical data on markets, sales, prices, products, firms, and whole economic sectors of both the U.S. and other nations; compilations of data such as physical properties, activities; and effects of chemicals, ceramics, alloys.

Tertiary Services

The primary and, to a lesser extent, secondary services often go only part of the way toward assisting problem solvers; many problems are complex or ill-defined, or they require comparative analysis of information by experts. Problem solvers who may lack the ability to formulate questions properly or themselves to locate data and information relevant to the question, or to analyze and synthesize such data and information, can avail themselves of the services of information experts. These experts, who are professional individuals or organizations specializing in the provision of tailor-made information services and consultation, comprise the tertiary sector of the information industry of the United States. The broad function of these services is to provide consultation in the information field, the scope of which may range from supplying the client with a source (of information, expertise, or solution) to furnishing the full or best answer to the client's problem. In particular, the tertiary services attempt to open access to the vast and complex informal communication networks in the United States -- networks that are highly specialized, dynamic and volatile yet which provide the network population (e.g., physicians) with access to fundamental sources of current information (e.g., drug salesmen).

The crucial aspect of taking advantage of the tertiary services is to locate expertise that is most appropriate to the problem at hand. This is a difficult problem, on account of the absence of any satisfactory ordering of problems versus information resources and capabilities (i.e., of conceptual devices for coupling problem solvers with relevant information services). Thus while the U.S. has possibly uncountable sources of appropriate expertise in its governmental, educational, professional, research and commercial institutions, the problem solver from a developing country may initially be unable to do better than approach some referral center.⁷

Partially in response to the increasing perception of information needs for development, the number of U.S. tertiary services is increasing in both the public and private sectors. On the public side, there exist dozens of highly competent information analysis centers sponsored by the government; on

⁷The National Referral Center of the Science and Technology Division, Library of Congress, maintains an updated subject-indexed database of 13,000 organizations having specialized knowledge in some area of science or technology.

the private side, there are numerous non-profit or commercial organizations and programs that specialize in consulting information services directed at developing countries.⁸ On the other hand, tertiary information services in the United States, as elsewhere, are in a formative stage, and hence the structure of this resource is still somewhat amorphous. Several indexed directories have appeared since 1976; these show clearly that the tertiary information services in the United States are very diverse and comprehensive in the scope of their expertise. As the modes of operation of the tertiary information sector stabilize, protocols for services, contracts, unit costs, and performance criteria will become standard. It is a fair statement to make, however, that an authoritative assessment of this sector remains to be carried out, so as to improve its potential for serving socioeconomic development of other countries.

IV. Suggestions for U.S. Position

The minimum conditions for effective transfer of knowledge for socioeconomic development include 1) a propensity on the part of problem solvers to use scientific and technical information; and 2) a level of indigenous organization ("infrastructure") that permits reaching and using exogenous information services. In contrast to industrialized countries, developing countries meet these two conditions only partially, and to highly variable degrees. In many countries the propensity to use knowledge is not widespread; there and elsewhere, problem solvers are not adept at mapping raw information into specific problems. Again, in contrast to industrialized countries whose information economy is supported by a vast complex of organizations and functions, many developing countries possess only rudimentary information infrastructures; some lack the organizational structure and mechanisms for information access and flow altogether.

⁸ Examples of these are the American Council of Voluntary Agencies for Foreign Service, Inc. which operates the Technical Assistance Information Clearinghouse, under a grant from AID; TECHNOCYC service of the Control Data Corporation, which provides a worldwide technology exchange service; UNIT, a magazine about licensing, new product development, joint ventures and acquisitions; VITA; and some corporate members of the Information Industry Association.

These differences between industrialized and developing countries, and among the developing countries themselves, argue fundamentally against the adoption by the U.S. of one general, sweeping proposition relative to information provision and transfer to developing countries. Rather, in the highly variable and non-uniform environment that characterizes the developing world, any single proposition or activity by the United States is likely to be effective in some countries only; in others it may prove inappropriate and possibly counter-productive. The alternative of favoring one group of developing countries over another is also not quite tenable, partly for reasons of political reality. The politically realistic and socially prudent option for the United States appears to be to formulate a long-term position toward information activities vis-a-vis the developing world, the overall objectives of which are sufficiently robust to embrace the whole range of developmental conditions and needs of the world's peoples.

The following set of five suggestions is presented⁹ which, in aggregate, aspire to define such a long-term position in operational terms. The suggestions are predicated on the proposition that the totality of data, information, expertise and experience generated and gathered by man in the course of purposive activities is of potential use in further advancing the development of mankind. The suggestions are complementary; they simultaneously provide for creating minimally adequate backbones of national information infrastructures in developing countries, for the concurrent nurturing of enclaves of problem solving users, for the (domestically beneficial) stimulation of new U.S. information products and services intended to serve previously dormant information markets, and for eclectic inter-governmental collaboration from which the United States as well as other countries can mutually derive benefits.

1. The long-term goal is for knowledge to become a desideratum whose worth is recognized by the individual problem solver. The first and possibly most important objective is to create an atmosphere in the developing countries that induces their people to want knowledge, that prompts them to actively seek it, and that encourages them to husband it conscientiously as an indispensable personal and

⁹ Condensed from: Slamecka, V. "Information for Developing Countries: Suggestions for U.S. Position." In: Slamecka, V., op. cit.

social resource. Of the means which foster such an environment the most effective ones are education, the uninhibited flow of abundant information, and demonstration of the pervasive effects of knowledge seeking and husbanding.

The United States has of course been a perennial advocate and leader in activities and programs that support this objective directly and indirectly. In addition to continued encouragement of programs for education of students from less developed nations in U.S. schools, of personal contacts at the person-to-person level among Americans and LDC nationals, activities that might be considered are: the revitalization of the Peace Corps concept in more knowledge-oriented formats; the development and dissemination of programs demonstrating the effect of knowledge-seeking on the standard of living and socioeconomic growth; and efforts to better understand the efficacy of existing and new techniques for inducing and fostering knowledge-seeking habits in economically less developed societies.

2. The United States should be prepared to advise and assist developing countries in the setting up of minimal organizational and functional capabilities for absorbing and using appropriate information. As part of the assistance, the players and roles of current and potential information user communities of these nations, and their institutional and organizational relationships would be identified; principles for the gradual development of incipient sectoral and national information services specified; and foundations laid for the development of indigenous information sectors.

Similar objectives are entertained by some international organizations (UNESCO, Intergovernmental Bureau for Informatics). These are concerned, however, almost exclusively with the establishment of generic guidelines, and are unable to provide the level of assistance necessary to register concrete impact. In contrast, the United States would provide the necessary first concrete steps if it were prepared to provide, upon request, initial guidance and training to incumbents in charge of the incipient national information functions, and to assist them with basic materials such as referral

tools, core collections, and possibly equipment for beginning efficient communication within and without their countries. Careful thought is needed, however, to set priorities for activities, and limits to U.S. assistance; the latter must not be a substitute for some level of indigenous commitment and investment.

3. Concomitant attention is needed to strengthen the flow of information already being transferred from the United States to the development world. The U.S. has an excellent opportunity to impact these information flows by incorporating information functions as a standard component of international and bilateral problem-oriented activities it sponsored in and among developing countries. The proposition is to interconnect via information flows, problem solvers in developing countries with their counterparts in industrialized countries, thus effectively building and strengthening networks of individuals and institutions clustered around common problems and interests. Already existing efforts of the USAID, NTIS and other agencies may be made still more explicit and formal through the following devices: establishment of problem-oriented transfer practices and channels; development of information carriers (conferences, meetings, bulletins for exchange of experiences); training of information personnel and of users; provision of information processing technology; and interfacing with existing U.S. and international information sources and services appropriate to the problem domain.
4. Simultaneously, the United States should undertake a program to mobilize its own development-oriented information resources and services so as to provide scientific and technical information service of the kind and form appropriate to the needs and environments of problem solvers in developing countries. The mobilization may take some or all of the following forms: a) stimulating the evolution in the private U.S. information sector of development-oriented information services for providing, in semi-processed form, information oriented toward the problem solving activities of different categories of LDC users; b) formalizing a U.S. referral

mechanism for creating and maintaining an inventory of U.S. resources and services, and for query switching; and c) establishing and promoting, in both the developing countries and the United States, more efficient communication protocols (such as standard formats for message exchange) for easier access to U.S. information resources and services, and for the delivery of information to the developing countries. These protocols might encourage use of suitable communications facilities, and provide appropriate information directories to developing countries.

5. The U.S. should actively support the organization of an international network for technological information, a United Nations initiative originating with the United States. The U.N. is currently examining alternate formats of such a network,¹⁰ seen as a basic facility for coupling problem solvers with information resources. The network idea is rendered even more attractive by U.S. leadership in the communication and information processing technologies.

V. Policy-Related Discussion

The evolving global information economy and its many-faceted international ramifications raise numerous issues of importance to the United States, some of which have been discussed elsewhere.¹¹ In this paper we broach some characteristics of three issues which bear directly on the posture and policy that the United States will wish to formulate in respect to information transfer to developing countries.

Although traditional U.S. information resources have generally been widely accessible to other countries, today the developing nations and their

¹⁰Slamecka, V., "Toward a Network for Global Information Sharing" (Draft). February 1979. (Paper prepared under contract for the U.N. Secretary General).

¹¹E.g., Kroloff, G. and Cohen, S., "The New World Information Order; A Report to the Committee on Foreign Relations of the U.S. Senate." Washington, D.C., November 1977.

intergovernmental forums seek to persuade the highly industrialized countries to take further and nontrivial steps to make these resources more useful. The preliminary program of action for UNCSTD and various regional papers prepared under the auspices of the U.N. not only reveal the objectives and strategies of the developing countries but are indicative of the magnitude of effort and the nontrivial nature of the steps the industrialized countries are asked to take.

The following discussion attempts to clarify this last statement.

The Meaning of Information and Information Services

Perhaps the strongest impression that emerges from this assessment and suggested positions is one of a need for a transfiguration of the traditional concept of "scientific and technical information" and "STI services." The less developed countries come clearly through in stating that their primary and urgent need is to have served the information needs of individuals responsible for guiding and implementing the planned economic and social development of their nations. One way in which this new user community differs from that of science and engineering is that its members are less accustomed to relying on and working with raw data and information that characterizes STI repositories; another difference is in the nature of their problems -- problems which often require other types and forms of information than those deposited in traditional STI stores.

To serve these new communities, therefore, a modified concept of information services appears necessary, one which incorporates, as one of the service functions, elements of the problem solving processes specific to the community of developmental decision makers and problem solvers, and which affords them access to experiential information that exists outside the STI repositories -- often as a form of human expertise, and hence "proprietary." These desiderata are a major departure from existing information services in developed countries, whose design is based on the premise that in these countries the decision maker and the problem solver have the inclination to operate on raw data and information, and the ability to access the necessary expertise through informal channels.

The upshot of this situation is as follows:

1. Information services aimed at the LDC, development-oriented user clientele are expected to possess analytical and problem solving capabilities that are not now available in existing STI systems regardless of their degree of sophistication and mechanization. These capabilities require further injection of human talent with both knowledge of information resources, the ability to operate on raw data and information, and to do so in the substantive domains of developmental problems. At this time it is not clear which problem solving functions should be incorporated in the new concept of information services or where is the dividing line between the services and the users as regards their respective responsibilities and capabilities for problem solving.

2. Despite the contention of some in the LDC user community that the traditional information resource of science and engineering is not essential to their interests, the new information services will continue drawing on both its bibliographic and (particularly) factual components.¹² The new resource element that these services will be in substantial demand of is the body of experiential knowledge that is widely distributed in the problem solving and decision making communities of the developed countries, relatively unstructured, sometimes withheld from the public domain, and primarily accessible through informal communication channels and networks confined to these specific communities.

3. Because of these new characteristics the services are likely to be relatively costly to whoever foots the bill. The cost of searching the formal repositories of data and information is minor compared to the cost of additional human services. The cost (and value) of the additional knowledge resources needed (experiential, proprietary) is not easily estimated at this time.

¹²Experiential knowledge is not independent of the raw data and information accumulated in the traditional resource called scientific and technical information; rather it is the result of one's experience of having used (i.e., analyzed, evaluated and otherwise manipulated) such data and information in specific problem solving processes, as well as the ability to replicate this experience in analogous problem situations. Hence the expanded concept of information does not diminish the importance and utility of primary and secondary scientific and technical information, as might be inferred from the current derailment by UNESCO Member States of the original UNISIST program objective to foster international communication in science. Scientific and technical information is the fundamental base for problem solving.

A U.S. decision to provide information services oriented toward the needs of socioeconomic development of other countries thus has numerous aspects, the more obvious of which are the vast differences in scope, complexity, demand on personal and proprietary knowledge, and cost.

The Economics of Information

Historically, results of publicly supported science are shared globally at prices that equal the cost of entering this information into and disseminating it through the open communication channels. Information developed as a result of privately financed research and development may be withheld from the open communication channels whenever it provides the funder with potential competitive advantage, unless it is secured legally (through letters of patent, licensing, etc.); this practice holds true also in socialist countries which often treat public-supported research results as proprietary.¹³ In contrast, the expertise and know-how accumulated by individuals in the course of problem solving activities have traditionally been considered to be the marketable property of these individuals, one which partly determines their economic standing in society. Expertise and know-how are made available to society through personal services of experts, private and public, at a compensation rate commensurate with their perceived utility and availability.

The desire for "free exchange of knowledge and experience," called for in the preliminary program of UNCSTD,¹⁴ is diametrically opposite to the industrialized countries' current perception of proprietary and experiential information as a marketable commodity in both national and international markets. Possibly, the call stems from a lack of understanding of the different economic treatment of different forms of knowledge in industrialized countries, where proprietary information does find its way into the economy and into social use, except at a (usually) higher price. To declare proprietary and experiential knowledge to be free for the asking is to court a fundamental perturbing of the economic basis of industrialized, free-economy countries.

¹³It is important to note that proprietary information is not synonymous with confidential information; the latter is usually withdrawn from the communications channels for reasons of national security, etc. Proprietary information is simply that which is held to have an above-par economic value, and which is made available when its price can be made to equal that value.

¹⁴UNCSTD. Preliminary Draft Programme of Action. 20 December 1978 (A/Conf. 81/PC.21). p. 7.

This is not to suggest that knowledge can or should be denied to others, or that its flow can or should be tightly controlled and regulated as a commodity. The question is not whether information and knowledge should be made available or whether information services should be reimbursed; the answer to both is affirmative. The question is, simply, who should shoulder the costs. The need to remunerate equitably the proprietors of above-par value information should not be negotiable, only the price and the payer.

The view of some types of information as an economic commodity clearly gives the industrialized nations an advantage. It places knowledge into the category of an economic and diplomatic resource, and prompts the country to maximize its value. The U.S. is in urgent need of a formulation of a thoughtful attitude to such a view of knowledge, and of a rationale and data supporting it. Meanwhile, both the private and public U.S. sectors are in urgent need of suggestions for guiding, and of mechanisms for coordinating, activities on international information markets. As long as the U.S. does not have a well-formed position vis-a-vis this resource, the national management of the resource is likely to be suboptimal.

Assuming that an equitable economic rationale for information transfer can be developed and internationally accepted, the United States should clearly benefit from actively engaging in international information commerce. Such commerce is facilitated by the design and development of appropriate information transfer systems, supported by efficient communication facilities. The United States, as a leader in the information and communication technology and its applications, would then seem well-advised to take a more dynamic role in advocating the development of international or global information transfer facilities, in contributing a leadership role in their design and implementation, and in materially assisting developing countries to become active nodes in such networks. Such assistance may be viewed as an early investment toward a client-industry relationship between non-U.S. problem solvers and the U.S. information sector.

Rationalizing U.S. Cooperation with Intergovernmental Organizations

Much evidence is available to support the contention that industrialized countries already view information and information services as national resources and commodities worthy of careful husbanding and capitalization. Such capitalization takes many forms, from promoting and advertising

industrial products and services to broadly based consulting in the knowledge sector. The economic equation also takes numerous forms; for example, the government of a developed country subsidizing its country's private-sector services to a developing country renders a form of economic aid to the latter while in the process opening up previously latent markets for its own industry. National marshaling of information and information services is viewed to be highly attractive.

In contrast, the sentiment of many developing countries to deal with national information markets of the industrialized countries is less than enthusiastic. Since one key issue in economic development is technological choice, information services provided by private, for-profit sectors of industrialized countries are viewed as being potentially self-serving, as are those of multinational companies. The preferences of developing countries may be summarized as follows: When there is analytical problem solving competence in the developing country, the preference is to obtain direct access to the source of information or expertise; when such competence does not exist indigenously, the preference is for services by uncommitted organizations, particularly the United Nations — especially as these are generously subsidized or free.

A counter-argument can be offered, however, to the effect that the desire of the United Nations to operate international information services may not be the best alternative for developing countries. U.N. information systems tend to be inefficient and very poorly utilized by developing countries. Many developing country policy makers privately admit that the U.N. is unlikely to provide effective information services. It should be also obvious from the discussion in the previous section that in order to provide the type of extended information services useful to the developing countries (tertiary services), the U.N. would have to develop large staffs of information professionals — and so compete with the information sectors of some of its member states.

As a member state of the United Nations and a sometimes active participant in its programs, the United States Government has in the past taken an inert position; it neither supports actively the U.N. information services, nor encourages U.S. competition with these services. The resulting impression is one of non-commitment. While the U.S. Government obviously

finds itself in a somewhat delicate position, as a minimum it behooves it to identify circumstances in which a more definitive position can be taken vis-a-vis international information services. One question which needs a more thorough examination than what is possible in this paper is that of the proper role of the United Nations as an information service vendor.

U.N. information systems and services fall into two broad categories: those which support internal operations of the U.N., and those which serve U.N. programs for its Member States. Information services of the latter category are of two types:

1. Bibliographic data banks of scientific and technical information which the U.N. operates as a middleman. Not being a producer of STI, the U.N. pools STI productions of Member States into bibliographic data bases and conducts computerized searches on behalf of Member States. INIS and AGRIS are the prototypes of subject-oriented data bases and services.

The government sector of the U.S. information industry has been less than enthusiastic in collaborating with these U.N. systems and supplying them the U.S. information input, partly because of the costs involved, partly because the U.N. systems in some cases represent competition for U.S. services, public and private. A possible position for the United States is to observe the following guidelines: if the U.N.-operated services are serving a worldwide need, and if they do not represent a serious competition for U.S. services, a U.S. information input to them is desirable. On the other hand, if the U.N. services compete with existing or potential U.S. international services, or if U.S. input to them is so expensive as to be prohibitive, the United States should assist developing countries to gain access to parallel U.S. information sources and services. Disregarding U.N. systems and not facilitating access to U.S. information resources and services is not a tenable position.

2. Specialized analytical information services requiring expertise in problem solving areas. These labor-intensive services, the performance of which often requires access to specialized data banks of bibliographic and, more often, statistical and numeric data, are provided upon request from individual Member States or for specific, circumscribed needs (e.g., comparative evaluation of competing technologies). UNIDO, UNEP, and ILO are particularly active in this type of information service.

These highly labor-intensive information services are costly, and their operation by the U.N. is warranted only if there are no other means for meeting National Members' needs. The obvious alternate resource is expertise resident in more developed Member States of the U.N. Until now, the problem has been the rallying of this expertise and channeling it for effective assistance to problem solvers in developing nations. The U.N. network for technological information is being conceived primarily as a mechanism to couple decision makers and problem solvers in developing countries with information and expertise resources in the developed countries. U.S. support of such a network concept, and the enlistment of U.S. information services (particularly of the tertiary kind) are steps in the right direction.

In general, unless the U.S. wishes to see the U.N. agencies continue assuming an ever larger and more expensive operational rôle as information vendors and consultants, our best strategy may be the mobilization of U.S. information service potential, so that it becomes more attractive to the developing nations' problem solvers than other alternatives, including the U.N. Subsidizing selected constituencies of such problem solvers in their use of American information services may have to be a component of this strategy.