

DEVELOPMENT INFORMATION IN AID

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LIST OF ACRONYMS AND ABBREVIATIONS

AA	Assistant Administrator
AA/LA	Assistant Administrator/Bureau for Latin America
AA/M	Assistant Administrator/Bureau for Management
AA/PPC	Assistant Administrator/Bureau for Program and Policy Coordination
ABS	Annual Budget Submission
AED	Academy for Educational Development
AID	US Agency for International Development
ARDA	AID Research and Development Abstracts
BIFAD	Board for International Food and Agricultural Development
CDIE	Center for Development Information and Evaluation
CDSS	Country Development Strategy Statement
CEO	Chief Executive Officer
CIDA	Canadian International Development Agency
CP	Congressional Presentation
DAC	Development Assistance Committee
DI	Development Information Division
DIC	Development Information Center
DIHF	Document and Information Handling Facility
DIN	Development Information Network
DIS	Development Information System
DR	Development Resources
EDP	Electronic Data Processing
ERIC	Educational Research Information Center
ESDB	Economic and Social Data Bank
FAO	Food and Agricultural Organization
GAO	General Accounting Office
GSA	General Services Administration
ICIPE	International Center on Insect Physiology and Ecology
IDB	Inter-American Development Bank
IDRC	International Development Research Center

ILRAD	International Laboratory for Research on Animal Diseases
IMF	International Monetary Fund
LTS	LTS Corporation
MIS	Management Information System
NASA	National Aeronautics and Space Administration
NTIS	National Technical Information Service
OECD	Organization for Economic Cooperation and Development
PID	Project Identification Document
PPC	Bureau for Program and Policy Coordination
PVO	Private Voluntary Organization
PW	Price Williams and Associates
R&RS	Research and Reference Services
REDSO/ESA	Regional Economic Development Services Office/East and Southern Africa
RFP	Request for Proposal
S&T	Science and Technology
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USDA	US Department of Agriculture
WID	Women in Development

TABLE OF CONTENTS

	<u>Page</u>
LIST OF ACRONYMS AND ABBREVIATIONS	i
TABLE OF CONTENTS	iii
LIST OF TABLES	v
LIST OF FIGURES	vii
EXECUTIVE SUMMARY	1
I. DEVELOPMENT INFORMATION AS A RESOURCE IN AID	5
A. Information as a Resource	5
B. Development Information in AID	8
II. THE "INFORMATION AS A TOOL IN DEVELOPMENT" PROJECT-- DISCUSSION AND RECOMMENDATIONS	11
A. Background	11
B. Specific Components of the "Information as a Tool in Development" Project	12
1. Research and Reference Services (R&RS)-- The Academy for Educational Development (AED) contract	12
a. Discussion	12
b. Recommendations: Expand the networking approach for more R&RS activities; provide more technical assistance to Missions and Bureaus; create a clearer link between R&RS outputs and top AID management	15
2. Document and Information Handling Facility (DIHF)-- the LTS contract	16
a. Discussion	16
b. Recommendations: Expand networking and acquisitions efforts of DIHF; provide additional technical assistance to network nodes; and explore new documents-handling technologies	20

3.	Economic and Social Data Bank (ESDB)--Price Williams and Associates (PW) contract	21
	a. Overview	21
	b. Recommendation: Increase networking and draft scope of work and RFP for new contract	23
C.	AID's Existing Overall Development Information System	23
D.	Recommendations	28
	1. Prepare and adopt AID Development Information Policy	28
	2. Create a Development Information Network (DIN)	29
ANNEX 1:	Scope of Work	1-1
ANNEX 2:	CDIE Organizational Chart	2-1
ANNEX 3:	Effective vs. Efficiency of Information Systems	3-1
ANNEX 4:	CDIE Cost Data	4-1
ANNEX 5:	DIHF Unit Operations Costs, FY 1986.	5-1
ANNEX 6:	Document Processing and Technological Change	6-1
ANNEX 7:	Thoughts Regarding an AID Development Information Statement or Policy Paper	7-1
ANNEX 8:	Suggested Steps Toward Creation of the Development Information Network (DIN)	8-1
ANNEX 9:	List of Individuals Met, Positions and Affiliations	9-1
ANNEX 10:	Bibliography	10-1

LIST OF TABLES

<u>Table Number</u>		<u>Page</u>
1	R&RS Demand and Effort Indicators, 1984 vs. 1986	13
2	FY 1986 Cost Recovery Potential of DIHF Operations . . .	18

LIST OF FIGURES

<u>Figure Number</u>		<u>Page</u>
6-1	Current System	6-2
6-2	Proposed System	6-4

EXECUTIVE SUMMARY

We live in an information age. As information has become so abundant and, via computers, so rapidly accessible, many organizations have come to regard it as a very valuable resource. They manage it as a resource--one as valuable as the traditional resources of land, labor, capital and management. This is because the possession and timely use of pertinent information improves the quality and value of output very substantially. To private companies this results in larger sales and profits. To public institutions it can mean better projects and programs produced more quickly at lower cost.

Information in AID is of two types. First is development information, which includes information generated from the development process and other information necessary to advance the socioeconomic well being of developing countries. It can be found in the forms of personal experience, video tapes, oral histories, speeches, maps, economic and social statistics, project papers and program reports, feasibility studies, technical studies and reports, evaluations and development strategy statements. Second is administrative information used to help manage the AID organization. It is contained in systems such as COORS (contracts) and RAMPS (personnel), which are longstanding and widely used.

Our evaluation results are very positive. AID's development information system has improved significantly in recent years. It is now much more complete, organized (in computer format), efficient, and utilized than it was five or ten years ago. Credit for this goes to those who designed Project No. 930-0232, "Information as a Tool in Development," in 1976 and to those who have managed this project since, especially in CDIE/DI. The system includes central database and document services (DIHF), research and reference services (R&RS) to respond to queries and provide assistance, and the provision and analysis of basic economic and social data (ESDB) from developing countries.

The development information system of AID is more advanced than those of most other national and international organizations that were reviewed, such as the World Bank and the Canadian International Development Agency. It is better organized, more widely used and broader in coverage than these other systems. AID also is making important progress in ensuring that its own development experiences are documented, made widely accessible, and effectively linked with other sources of development information for use by AID staff and others.

DIHF, R&RS, and ESDB functions are performed for CDIE/DI by three private contractors, all of whom are doing a competent, professional job. Other Agency development databases in such units as the S&T Bureau, Participant Training, WID, Housing, etc., are increasingly being interrelated with and incorporated into the central database.

AID's development information effort has expanded and performed very well over time. There continues to be room for improvement, however, especially along the lines of network development and in making more development information available to top management. At present, the R&RS activity is a strong central node in an emerging network that deals primarily with written materials. This configuration sometimes makes it difficult for R&RS to provide timely information to Mission users or to supply exactly the data needed. At the same time, R&RS has little budget to assist DI nodes abroad to expand to meet their own needs more fully. The DIHF, which now has some difficulty acquiring documents and in making its database widely accessible, could be more effective in both areas via more networking. ESDB, which operates in a fairly centralized manner, could help ensure end user participation in country or regional data development and analysis through more networking as well.

AID's development information system also lags behind some large private companies and other public institutions such as GSA, NASA and the Department of Education. AID is not as far along in creating its development information system as these other companies and organizations, nor in managing development information as a resource. Also, AID's system does not link the upper echelon of management with development information as effectively as other systems, especially those in private companies.

Thus, even with all the progress of the past, our evaluation results indicate that AID's development information system could still be more efficient in enabling AID decision makers worldwide to obtain the critical information they should have when they need it. We believe the basic reason for this situation is that top management of the Agency has not yet fully recognized that development information is a very valuable resource as necessary and important to Agency strategy, program and project operations as are other resources such as personnel and budgets. The Agency's work cannot be done efficiently without ready availability of and access to development information by top management and other staff in AID and a clear requirement that both contribute to and utilize it. The more effective the development information system and the more people access and use it, the better projects and programs the Agency will have. Moreover, in this era of declining public sector budgets, more effective use of information is one central means of increasing the productivity of the human, capital and other limited resources that remain available.

AID is now in a position to substantially improve its existing development information system. Three key recommendations we make in this report to accomplish this are as follows:

1. Draft, Discuss, and Adopt a Policy Regarding Development Information

The Agency should draft, consider, and adopt a basic statement or policy regarding its management of development information. This statement will recognize that such information is a resource that has direct value and facilitates the management and increases the productivity of other Agency resources. It will indicate that development information must itself be carefully managed and fully integrated into Agency-wide management as well. The statement will assign responsibilities for development information management, establish uniform standards and procedures for acquiring and accessing it, develop an informed information acquisitions program, and set requirements for the use of such information by Agency staff at all levels. An outline for such a statement or policy is provided in Annex 7.

2. Create an Agency-Wide Development Information Network (DIN)

The current system is basically centralized in that the Bureaus and Missions act as clients and users of CDIE/DI's system rather than as responsible participants or partners in its growth and maintenance. Some Bureaus and Missions use and support it, others do not. The DIN concept would bring all parts of the Agency into a network--a "live" database comprised of individual end users and nodes linked via voice and computer to exchange voice messages, video, data, printed material, maps and other information--and assign each certain duties and responsibilities. Use of the system would be required in all program/project work. CDIE/DI would establish Agency-wide standards and guidelines so that the system is unified, collaborative and efficient, as is the case with major corporations which manage their information resources for peak performance and profitability. Four steps that should be taken in the next two years to move toward the establishment of a fully operational, effective DIN within the Agency in four to five years are outlined in Annex 8.

3. Provide Technical Support to DIN Members and Other Development Information Projects and Activities

As the manager of the DIN, CDIE/DI will have to substantially increase its capabilities to provide consulting and technical assistance to Bureaus and Missions in the installation of the components of DIN, training of personnel in its effective use and in trouble-shooting. It also should play a more active role in improving development information capabilities within individual AID projects and in developing countries. DI, together with its contractors, should recognize this and gradually prepare for it as AID expands its use and support of development information as an essential resource in achieving socioeconomic progress.

I. DEVELOPMENT INFORMATION AS A RESOURCE IN AID

A. Information as a Resource

The generation and use of information has increased dramatically in recent years. This is for two reasons: first, the sheer quantity of information has been expanding as never before; and second, the development of even more powerful computer/telecommunications systems makes it possible to store and access pertinent information almost immediately. The US has become an "information economy". The average executive in an organization spends the majority of his/her time in processing and communicating information. More than half of the US work force have jobs that primarily involve information processing, i.e., documents, reports, plans, analyses, etc. Indeed, the provision of information has itself become a major business.¹

Information is now considered by many organizations as an economic resource--a resource as important as the traditional resources of land, labor, capital, and management. This is because the possession and timely use of information can improve the quality and value of output very substantially. For private companies this can result in much larger sales and better profit margins. To public organizations it can mean the production of better projects and programs more quickly and at lower costs.

Information can be defined as data which has been processed to make it more valuable to the organization. Data itself is raw material--it can be manipulated and processed to create new knowledge useful to the organization, i.e., a resource. It is an input, like labor and capital, that helps produce outputs. For example, American Airlines extracts information on its frequent flyers from its computerized reservation system (AAdvantage). It then directs specific marketing promotions to these individuals. Now widely copied by others, this effort gave American Airlines significant competitive advantage during the initial phases of airline deregulation in the U.S.² A large book publisher computerizes and puts "on-line" its tax services materials to its legal and accounting clients, making its service much more timely and valuable than those of its competitors which continue to mail the traditional loose-leaf books to clients. Sears Roebuck uses information in numerous ways to increase its performance and extend its markets. For example, it monitors appliance purchases made by each customer together with service plans and maintenance calls carried out, thereby tracking for customers the status of each of

¹The information business includes computer and software manufacturers, telecommunications companies, information processing and publishing companies, office equipment and systems firms, programming services, related consulting firms, and the like.

²Jackson, Ian, Corporate Information Management (US: Prentice Hall, 1986), p. 6.

their appliances.³ Major medical organizations like Suburban Hospital in Bethesda, Maryland use information systems to speed the entrance of patients and document patient activity during each visit.

There are several categories of information. For purposes of this report two broad categories--administrative information and development information are delineated. The first category assists in the internal control and management of an organization. It consists of such items as budgets, materials inventories, the status of contracts, personnel ranks and assignments. This type of information is essential to day-to-day operations and the data is within and under the control of the organization and thus easy to capture and retain. It includes most of the routine quantitative activities called EDP (electronic data processing) in many organizations. This administrative information is well developed and widely used in most large organizations today.

The second category of information includes items such as technological developments, new project ideas, market conditions, activities of competitors, reactions of customers and clients, use of evaluations to help design new programs and projects, etc. This substantive or development information is more difficult to keep current because it may be transitory, is less easily acquired or controlled by the organization and is often subjective and not quantifiable. Those who have such information often hold it closely and do not make it easily available to others in the organization. Thus it invariably lags behind and receives less attention by managers than administrative information. Yet in many ways this development information is more important because it relates to the very existence of organizations. In the case of profit-oriented companies, if they cannot relate successfully to their outside environments they may ultimately collapse. In the case of non-profit making entities, the absence of such information may make them less productive and more costly than others.

Any resource must be well managed to be most useful. Major corporations and organizations that recognize information as a significant resource have taken specific policy and organizational steps to effectively manage it. In the course of this CDIE study, we have considered how some major corporations, such as Mobil, American Airlines, American Home Products, FMC Corporation, Reuters, Japanese financial and trading firms, etc., manage their information resource. The top management of such companies is primarily concerned with getting necessary and useful information to the right place in the organization at the right time to assist in making assessments and decisions. They are not particularly concerned with technical matters such as how computers operate, although they do want to keep up with technological advances that make information acquisition and flow more efficient.

³Jackson, Corporate Information Management, p.6.

These corporations invariably have an overall plan or policy regarding the management of information. This plan comes from the top--it is discussed and approved by the Board of Directors, the Executive Committee, or the President or Chief Executive Officer (CEO). Thus all elements of the corporation are aware that top management fully recognizes the key importance of the information resource and is committed to effective management of it.

The key objectives and concerns of such information resource management plans include the following:

- o Integration of information with all other organizational resources and use of information to help formulate and attain strategic objectives such as expanded markets, greater resource productivity, a higher quality of decision making, a more positive corporate image, etc.;
- o Enhancement of the firm's productivity and efficiency in all its information handling activities, including improving the integration of all human resources with the information management services' responsibilities within the firm; and
- o Integration of various forms of information (data, text, image, and voice) and the media (carriers) of both analog and digital information (paper, film, electronic, optical) and of all participating entities (nodes).

A senior corporate officer is usually given responsibility for the overall management of information. This officer may have a title like Information Resource Director, or Senior Vice President for Information. He or she runs an autonomous organizational unit reporting directly to the CEO or his/her Deputy. In heavily centralized companies, most entities in the corporation that collect and process information may actually work for this executive. But such is not the normal pattern. Large, worldwide corporations such as those we have mentioned contain numerous databases which operate autonomously, but--and this is the key point--they follow common standards, guidelines, and procedures regarding the information resource that are set down by the senior information executive. This senior executive integrates and coordinates the various databases (some companies have more than 50, and access to many more outside) through common policies, standards, controls, and compatible equipment. All units must participate in the system and share in it--all are both contributors and users. Audits and evaluations are conducted by the senior information executive periodically to check performance and assure that all units are performing under the approved policies and standards. His/her office also provides assistance, training, and technical services to all units, keeps current on new knowledge and expertise, and usually is responsible for the corporation's central database.

B. Development Information in AID

The Agency for International Development (AID) is inundated with both administrative and development information. It is everywhere--in every office in Washington and in USAIDs overseas. It is provided and used by AID's employees, contractors, and consultants at all levels, by developing countries, by many different organizations and by almost every person involved in development activities.

Development information is found in the forms of personal experience, video tapes, oral histories, speeches, maps, project papers and program reports, evaluations, feasibility studies, technical studies and reports, evaluations and development strategy statements. This information can be obtained from individuals, private corporations, governments, AID, the World Bank, UN agencies, the OECD, universities and a variety of other organizations. It is in constant demand and used by AID as a resource to be consulted because AID deals with great chunks of human knowledge and activities--e.g., agriculture, education, health, industry, transportation, business, banking and finance, trade, national planning and policies.

Administrative information has also been particularly critical to AID because of shifting foreign assistance policies and objectives and the extensive personnel and management problems inherent in a worldwide program. Such information includes organizational and personnel data, inventories, financial flows, contracts, etc., and is maintained in such computerized systems as RAMPS (for personnel), COORs (contracts), and others, usually under control of AA/M. These important systems are well-established and the information they generate is widely disseminated and used by the Agency. The absolute necessity for this type of information is not questioned.

Development information is a resource of considerable importance that should be continuously tapped in the preparation and implementation of Agency plans, programs, and projects. It should be available in a systematic, timely fashion. Yet this has not always been the case. For many years there were no formal systems in the US foreign aid agencies to acquire, keep, and utilize such information. Documents were filed haphazardly in office or personal files in Washington and abroad, or left with contractors and consultants. Valuable knowledge often was available only directly from experts.

Gradually, awareness of the value of such information grew within some units of AID and systems were established to have it available for consultation. The participant training staff developed a method to track trainees. Technical officers established or acquired access to databases in their specialties--the population database POPLINE is an example, as are the Food for Peace and BIFAD information systems. Libraries and information centers were established in Washington and at some Missions to hold documents and make them available.

During the late 1960's and 1970's, AID undertook efforts to centralize and systematically manage its development information. A key step was taken in 1975 with the approval of Project Paper No. 930-0232, "Information as a Tool in Development," under which several ongoing information collection and dissemination programs were unified within the central technical bureau. This flexible project has been funded since 1976 as a worldwide, continuing activity. It is the basis of the Agency's existing central development information system. The stated purposes of this project are to acquire, process, organize, synthesize, disseminate, and improve technical, statistical, and project information on AID and other development experience and to provide technical services in the extension of development information. Under the project a central development information unit called the Development Information Service (DIS) was funded. In addition, other databases have been developed in the pertinent units of the Agency covering specific topics such as population and health, participant training, housing, etc.

Another significant step was taken in 1984 with the creation of the Center for Development Information and Evaluation within PPC (PPC/CDIE). This step was prompted by a GAO report saying that AID was not using its past experience in the creation of new activities. CDIE merged the Agency's centralized development information activities (including the DIS) with the evaluation office, because evaluations produced information and lessons that could be applied usefully to future AID projects and programs if they were carefully disseminated. The merger of these two functions under a senior officer in the Agency's central Program and Policy Coordination Bureau has upgraded their visibility and importance.

CDIE's two Divisions are Program and Policy Evaluation (CDIE/PPE) and Development Information (CDIE/DI). DI is now the central development information unit of the Agency. The Director and Deputy Director of CDIE/DI are AID veterans with many years experience in information activities. DI manages the "Information as a Tool in Development" project (under Project No. 930-0232), from which three private contractors are funded to perform the bulk of DI's work. This includes provision of research and reference services, operation of the DIS, and provision of global economic and social data. The operation of these contracts is discussed in part II of this report. About three-quarters of CDIE's program budget of approximately \$4 million per year goes to DI. About the same percentage of the higher 1989 CDIE budget request (\$5 million at the top level) would go to DI.

DI also manages two activities with USDA under a separate Project, No. 930-0234. One of these is the joint USDA-AID Technical Inquiry Service which has existed for many years, handling agricultural queries from AID Missions and AID/W staff. This service generally is the same as that provided by DI's research and reference services for other queries. The other activity is statistics on Third World food needs and production provided by the Economic Research Service of USDA. Both of these activities seem to be productive and useful to AID and should be continued.

II. THE "INFORMATION AS A TOOL IN DEVELOPMENT" PROJECT-- DISCUSSION AND RECOMMENDATIONS

A. Background

AID finances the bulk of the three major activities of DI-- research and reference services, information management, and economic data--under Project No. 930-0232, "Information as a Tool in Development". Three separate contractors carry out these activities.

The development information provided to AID's clientele and its contractors falls into four categories, arranged below by increasing amount of "value added" services.

- o Provision of documents known to exist and requested by users. These documents fall into three groups: those whose citations are contained in the AID document databases; those contained in the AID Library; and other documents not subsumed in the first two groups. Depending on the group, the requested documents are supplied in photocopy or microfiche, occasionally in original copy. Most of this work is done by the contractor LTS Corporation.
- o Provision of data or information relevant to specific problems or topics requested by users, usually done by the Academy for Educational Development (AED). This is usually accompanied by a memo explaining the data. The types of service in this category are:
 - Database searches, producing printed output of bibliographic citations and often abstracts or tabular data. Database searches are of two varieties: on-demand (a single search event), and periodic (called current awareness);
 - Referrals, i.e., usually the provision of names and addresses of persons or organizations that are likely to be of assistance to the user; and
 - References, i.e., the provision of uninterpreted facts or data directly useful to the problem solver.
- o Synthesis of the contents of documents pertaining to a problem or subject identified by the user. This service by the contractors AED and Price Williams and Associates involves conducting an automated literature search, accessing the documents identified by the search, and then summarizing the salient contents in some logical pattern.

- o Analyses (usually by AED) of human and organizational actions and/or experience described in various types or documents and records. This activity consists of conducting an automated literature search, obtaining the documents and records so identified, and writing a critical analysis of actions, experience and outcomes of issues or problems described in the documents.

B. Specific Components of the "Information as a Tool in Development" Project

1. Research and Reference Services (R&RS)--The Academy for Educational Development (AED) contract

a. Discussion

AED provides DI with research and reference services (abbreviated to R&RS), including operation of the AID library, under a five-year contract that ends in October 1990. The scope of work is lengthy and widespread.

Our evaluation results of R&RS are very positive. R&RS is responsive, provides information that is timely and accurate, and serves as a valuable resource to many AID offices around the world. AED is carrying out the scope of work professionally and competently.

The AED Staff spends the majority of its time responding to queries from AID officers both in Washington and abroad, from AID contractors and consultants, from other Government entities such as the State Department and the Congress, and from the general public (the library now handles all queries from the public). As Table 1 indicates, the number of requests has been increasing and the total effort needed to respond to them decreasing, giving an increase in efficiency in handling requests from 1984 to 1986 of two-thirds when measured in hours of effort. Although some of the 1984 data may not be completely accurate or directly comparable to 1986 data, one can nevertheless conclude that AED's efficiency in responding to information requests has improved significantly.

In reacting to queries, AED normally identifies the most relevant AID and non-AID documents and provides the requestors with a synopsis of them, together with copies of those that the searchers consider most relevant and important. From conversations with users in both AID/W and overseas Missions, this form of response seems to be best. Such formats point the end-users in the right direction and allow them to sift selected sources for germane information. Users like some synopsis, annotated bibliographies, and information packages. Too much "value added", in the form of extensive research and critical analysis, often does not respond to the user's need and is time-consuming and costly to perform. Thus AED and the other contractors normally should avoid extensive "value added" responses.

Table 1: R&RS Demand and Effort Indicators, 1984 vs. 1986

INDICATOR	1984	1986	(%)
TOTAL REQUESTS	9,979	12,195	+22
TOTAL EFFORT (HRS)	16,373	5,653	-65.5

It is also true that AED and the other contractors should continue to concentrate on reacting to requests and deemphasize proactive products that are not requested. A demand-driven operation, which of course presumes an active marketing campaign to make the availability of services known, is the most productive. Pro-active products that have attempted to summarize AID's experience in given topics often appear to have been information in search of a market. One area part way between demand-driven and pro-active is the desire of management and staff to be better informed about areas they are not well aware of. R&RS's report on information requested and the response provided and other formats can be very effective tools in this area.

Annex 4 contains data concerning the distribution of funds and work effort between the categories of administration, technical services, user services, and training and consulting in DI during FY 1986. AED's figure of 42 percent for administration seems high, but we were told that this was in part due to start-up administrative work, and the figure decreased significantly in FY 1987. Managers and staff of AED understand their responsibilities well. Staff is flexible, and able and willing to adopt to changing levels and types of workload. Record keeping seems well done.

AED's library functions are performed well by a competent staff. Unfortunately this staff must perform some routine clerical work in the absence of adequate clerical support. The library itself is not in the best location to serve both AID and the public and is relatively small and somewhat cramped. Many public bodies in Washington have more inviting, larger, more centrally located libraries, e.g., State, World Bank, etc. Agency management should address this matter as soon as possible.

There is some potential for charging user fees to non-AID persons and organizations for R&RS assistance. Examples would include: database searches, AID document identification and retrieval, library privileges, library acquisitions list updates, inter-library loans, provision of non-AID printed, disk, or microfiche materials, and software. However, the amount of money involved in providing services to non-AID users is not large and the expense of developing and operating a user fee system to capture these costs would be significant. Also, once a user fee system was attempted, many present requesters would stop their use or shift to other suppliers because the "free good" aspect of R&RS services had changed. Remaining users would then compare R&RS services to others available, and AID would have to match the content and quality of other suppliers to retain non-AID users. We conclude that there should be no charges for R&RS services, and that AID's proprietary database should be made available to the public through public or private commercial organizations free of charge, if they are interested in it. The National Technical Information Service (NTIS) already includes some AID materials in its database for the public.

While R&RS services are valuable and effective as now provided, there is still room for improvement in provision of development information to AID staff and others. More decentralization of R&RS activities would increase, in some cases, the timeliness and accuracy of information for end-users. An even more extensive networking approach than already realized by DI could result in more shared information, of all kinds--print, materials, voice communication, video tapes, graphics, and data. Strengthening of R&RS's technical assistance role to Missions and projects with development information components would encourage such networking and help identify information needs of AID staff and other development practitioners. A clearer linkage between R&RS outputs and top AID management could help AID reduce the costs and increase the impact of its overall development effort.

- b. Recommendations: Expand the networking approach for more R&RS activities; provide more technical assistance to Missions and Bureaus; create a clearer link between R&RS outputs and top AID management

R&RS should continue to encourage expansion of networking among itself and Missions and between Missions and other development information nodes as a means of further increasing the importance, timeliness and accuracy of development information for all AID's end users.

There is a requirement in AED's contract for the provision of technical and consulting assistance to Missions and other AID units in development information research and reference matters. Although some of this is being done, it is now secondary to responding to queries. As AID's development information system evolves, as more users want to query the system direct, and especially if it is decided to proceed to DIN, the requirement for technical and consulting assistance services will increase substantially and will assume relatively greater priority and importance than query responding. DI should recognize this and gradually take steps to increase its capabilities in this area.

At present the current contractors' budgets do not permit much travel abroad. This matter must be addressed as more networking cannot succeed unless DI and its contractors have adequate budgets to provide necessary consulting services to the overseas nodes.

DI should continue to encourage R&RS to link its development information with top AID management. This will be easier to do if key AID decision makers support the management and use of development information as a critical resource, but R&RS should seek to provide high level AID officials with additional useful development information in any event.

2. Document and Information Handling Facility (DIHF)--The LTS contract

a. Discussion

DI's Document and Information Handling Facility (DIHF) is located in Chevy Chase, Maryland, and operated under contract by LTS, Inc. The company spends about two-thirds of its time under the contract handling the DIHF and working for DI, and performs service for AA/M the remainder of the time. The five-year contract ends in September 1989.

As with R&RS, our evaluation of DIHF activities is very positive. The DIHF, which carries out a wide range of activities, has performed very professional and effectively in collecting, maintaining and making available AID and selected non-AID documents. The contractor handling the DIHF function for AID is performing well.

DI is required to collect, maintain, and make available to qualified users documents prepared by the Agency and its contractors, as well as selected non-AID documents. DI and LTS meet this requirement by documents husbanding, provision of document access tools, and document reproduction and delivery.

The husbanding system flow encompasses document acquisition, processing (bibliographic description, indexing, abstracting), microfilming, operation of databases of document surrogates, and maintenance of archival collections (paper and microfilm).

To assure that documents collected and processed are known and available to the Agency and to other users such as AID contractors, DI and the contractor produce, or make available several tools to the user community: ARDA, an abstracting journal issued in approximately 25,000 copies annually; monthly lists of new acquisitions; online searching by users of the electronic databases of AID document surrogates; distribution on diskettes of portions of these databases to selected Missions; distribution of sets of microfilm document collections to AID Bureaus; printed indexes to the collection of documents in microfilm; and maintenance and availability of the AID computer thesaurus.

LTS also provides document reproduction and distribution services. Documents requested by users are photocopied either from the original document or its microfilm (a small fraction of requests for documents are met by reproducing the microfilm itself) and sent to users. Bulk distribution is made of CDIE and other Agency publications.

These document handling operations are standard and do not deviate appreciably from operations of typical bibliographic database producers, public and private, for the past 20 years. The total size of the database (about 50,000 documents and 8,000 projects), new acquisitions, and the volume of searches and reproduction, designate the DIHF as a medium-sized operation.

DIHF unit costs are generally comparable to similar costs of other database producers, as obtained during the course of this study.¹ For example, the average direct cost of document processing at the DIHF is \$43.12, compared to \$39.42 at the NTIS. Thesaurus maintenance costs at the DIHF account for \$275 per term added, compared to \$250 for the Educational Research Information Center (ERIC). The average document reproduction cost of ERIC, \$1.85 per 25 pages, compares with \$3.93 per a 100-page document at the DIHF. Some differences do exist, however, at least on the surface, in budgets for the computer centers and in microfiche duplication costs, suggesting a need for further analysis.

Overall cost comparisons between database producers must be made carefully because no two systems are identical in their mix of operations and volumes of data handled. Of figures that could be verified, the respective percentages of the budgets of NTIS and DIHF for management and administration are 19.0 and 14.6; for marketing, 8.0 and 1.6; for acquisitions, 4.0 and 6.4. The costs of technical services are not easily comparable because NTIS receives much of its input in preprocessed form. User services (termed "order processing and fulfillment") in NTIS account for 52 percent of the budget. If this is interpreted as including computer and database operations, publishing, microfilming, and document reproduction and distribution, the respective DIHF figure is 66.9.

Similar figures for ERIC were unobtainable. However, it is interesting to note that the combined 1986 annual budgets of DI, DIHF and R&RS (the latter without its library, database search and special studies components) is approximately \$2.2 million. Dividing this figure by the total number of new documents processed in that year (10,000) yields the figure of \$220. The comparative figure for ERIC is \$208.

Several products generated by DIHF are made available to users outside the Agency and it may be asked whether it is advantageous to charge such users a fee. Table 2 shows estimates of the cost recovery potential of the relevant products. It suggests that the two operations to consider commercializing would be the document reproduction service and ARDA, each generating perhaps \$80,000 annually. However it seems highly probable that the demand for documents and ARDA would drop significantly if fees were introduced. Thus, it should probably not be done at this time.

While our evaluation results of the DIHF are very positive, there is some room for improvement.

¹Annexes 4 and 5 show the breakdown of the cost of DIHF operations. Annex 4 provides the distribution of DIHF costs for FY 1986, as part of the total DI and contractors' budgets. Annex 5 shows the unit costs of major DIHF operations.

Table 2: FY 1986 Cost Recovery Potential of DIHF Operations

SERVICE	DIRECT SERVICE COSTS	ESTIMATED PERCENT OF NON-AID CLIENTELE	NON-AID COST RECOVERY POTENTIAL
Database searches	\$ 89,595	33%	\$29,566
AID document delivery	10,860 (R&RS) 233,073 (DIHF)	33% 33%	3,484 76,914
Non-AID doc. del. (ILL)	21,720	33%	7,167
ARDA, etc.	166,000	50%	83,000

First, there is a problem with documents acquisition for insertion into the DIS. Such acquisition is now both incomplete and slow and is widely perceived by CDIE and users as a serious problem. This deficiency is rooted in the relatively laissez-faire method of identifying and collecting documents, which relies on the good will of AID project, technical, and program officers in Bureaus and Missions over whom DI has no control. Contact by DI with Mission personnel is rarely direct; more often it is mediated by Mission librarians (where available) or informal "contact" persons identified by DI. Officers in both Missions and AID/W attach different degrees of importance to obtaining and forwarding documents to DI. Some do not enforce report submissions by contractors and consultants; others keep reports in their personal "libraries" rather than share them through the existing system, even if they are cognizant of the system. DI's contractor, LTS, Inc., has been persistent and creative in locating documents, especially from Washington Bureaus and officers, and getting them into the DIS. Despite such efforts however, LTS has been unable to put some key AID documents into DIS--e.g., Mission action plans are still not available through DI. Thus, DI needs support from the Agency's top management to improve the process and make it more complete and timely. Management should strengthen the acquisitions mandate of DI and require it to develop and institutionalize a thorough, more effective and timely document--gathering process throughout the Agency. This should be formalized as part of Agency policy and expanded development information networking efforts.

Second, the future of software used in the development information system of the Agency also needs attention. DI now uses an information management software package called MINISIS, introduced 10 years ago by Canada's International Development Research Center (IDRC). This package lacks portability, i.e., it is not written in a language supported by a wide range of hardware.² Since hardware is unlikely to be standardized, MINISIS is becoming relatively inflexible. It also fails to meet other desirable criteria, such as the ability to support full text on both magnetic and optical storage media. In conversations with IDRC staff, it was learned that IDRC plans to migrate MINISIS under C, the native language of the Unix (Bell Laboratories) operating system. This would make MINISIS highly portable since C compilers exist on a large variety of hardware. IDRC also intends to enhance MINISIS to support full text. IDRC's schedule is to have the C-language version available beginning in 1990, but experience shows that such schedules normally slip.

²Software portability is highly desirable in a network environment because users need know only one command language. It differs from database portability which refers to the ability to transfer a database to run on other machines (and possibly, under other software); database portability does not imply the use of a single command language except in a portable software environment.

DI has two software alternatives. One is to continue using MINISIS and furnish temporary software (such as the DI produced MICRODIS package) to Missions and other users and then replace it with the portable version of MINISIS when available. The advantage of this approach is that AID is not involved in software conversion. The drawbacks include the risk that the portable version of MINISIS may be delayed or not materialize at all.

The second alternative is to convert as soon as possible from MINISIS to a start-of-art, commercial information software package in the process of creating additional development information networking capability. Packages such as BASIS (Batelle) and BRS mini-Micro (BRS Information Technologies) are vertically and horizontally portable, they feature unsurpassed information management capabilities (including database portability), and support magnetic as well as optical storage technologies. In other words, they possess and have tested all functional features that exist in or are planned for MINISIS several years hence. By the time MINISIS is rewritten, these packages will undoubtedly have even more powerful enhancements. For these reasons, and since it is desirable to move toward implementation of additional development information networking, this alternative deserves very close study.

Which of these alternatives should finally be adopted by AID depends on several factors. Financial implications in particular must be carefully examined. In any event, in-house software development such as MICRODIS should probably not be a continuing program of DI. MICRODIS will continue to be used to solve library management applications requirements in the short-term. However, in the long-term, MICRODIS cannot compete with either MINISIS or commercial software as a candidate for a single, standard applications software for an expanded development information network.

Finally, DIHF type activities and outputs could be further networked. For example, DIHF's database could be made more readily available to end users using optical disk technology, network nodes within such a network could be encouraged to provide or access documents, thereby helping with acquisition, and more DIHF technical assistance to network participants could expand document acquisition and access within the system and make it more efficient at each node.

- b. Recommendations: Expand networking and acquisitions efforts of DIHF; provide additional technical assistance to network nodes; and explore new documents-handling technologies

DI should continue, with its contractors' support, to expand its networking with AID nodes and end users, including making its database directly applicable to them whenever possible. Acquisition efforts should be vigorously pursued, hopefully with the full support of AID management via a development information policy statement and its implementation.

As AID's development information system evolves, more technical and consulting assistance will have to be provided by DI to the nodes. DI and LTS should recognize this and take steps to increase pertinent experience and capabilities. Related to this, the LTS contract ends in September, 1989 and that of AED about one year later. Work under both contracts will become increasingly interrelated and similar if the DIN proceeds. Thus for ease of management it makes sense to consider merging them into one contract beginning in late 1990.

We also recommend that DI explore the possible introduction of new technologies such as digital imaging and optical storage into the documents handling process. (See Annex 6 for an analysis of this issue.)

3. Economic and Social Data Bank (ESDB)--Price Williams and Associates (PW) contract

a. Overview

The general purpose of the Price Williams and Associates contract is to provide CDIE with integrated evaluation and statistical analysis services. PW collects data from existing evaluation, technical, economic and social databases and combines and analyzes them to meet Mission and AID needs. The total contract amount is about \$1.7 million and runs for three years from April 1985 to April 1988.

Like its sister components in DI, this aspect of AID's development information system receives high evaluation marks. PW is performing that portion of its contract managed by DI in a competent professional manner, providing data and analysis essential to AID.

Although the written contract as such was not changed, work and personnel under it were split into two distinct parts in 1986. Evaluation activities and the people performing them were retained in CDIE's Evaluation Division, and those concerned with economic and social data were transferred to DI. The latter group operates the Agency's Economic and Social Data Bank (ESDB), a computer system which stores economic, financial, trade and social data. This splitting of activities and personnel in the contract was quite reasonable given the functions of the two Divisions. However, it has caused some administrative problems which apparently have now been corrected.

The PW contract and ESDB are managed by an experienced Foreign Service Officer economist. He has two direct hire employees on his staff, and the contractor provides four professional and two support personnel. They perform two major functions--acquiring, maintaining, manipulating, analyzing and distributing pertinent macro economic and social data for use by Agency personnel and selected outside users, and responding to requests. The majority of time is spent on the first function. Much of the output is sent to AID Missions in easily-used microcomputer diskette form. Other important tasks include preparation

of basic data for the Congressional Presentation (CP) and other Agency publications. This unit also is attempting to prepare meaningful indicators to measure progress in AID's major areas of development concern. This is being done in collaboration with the Bureaus. Responding to requests forms perhaps one-quarter of the workload of the unit. Some of these are of major importance to the Agency, such as data and charts for the Administrator's Congressional budget presentations, for the Secretary of State, etc. Others such as queries from students are dealt with more routinely.

The basic data included in the ESDB are not created by DI or the contractor, but are acquired from recognized sources, including the World Bank, IMF, FAO, UN, OECD, USDA, etc. There is some modest overlap with databases in other units of AID. However, since most Bureau material is related to specific Bureau projects and programs and the ESDB contains primarily macro and global data, this overlap does not appear significant. In fact, the contractor often coordinates closely with other databases and units of AID in doing analysis and preparing material.

PW is performing the portion of its contract managed by DI in a competent, professional manner. Much of what it produces is absolutely essential to AID, e.g., CP data, CDSS data, analysis and charts for presentations and hearings on the Hill, etc. The approach of relying on material from recognized sources makes sense. The percentage balance between the origination of material and responding to requests (about 75-25) seems reasonable. The question of user fees is not pertinent since requests from the public are not large and are usually handled quickly and easily.

The ongoing efforts by DI and the contractor to structure meaningful indicators to measure Agency progress in key development areas are interesting and innovative and could be quite productive. We believe that they should be encouraged and continued as time and resources permit.

A few Missions and technical personnel have complained that data in the ESDB is sometimes not reliable or up-to-date. Although such complaints are sometimes justified, DI and PW cannot be faulted because they are simply using material put out by the most reliable international sources. DI tries to emphasize to users that their data is a "starting point" that can be changed by Missions and Bureaus if there are good reasons for doing so. Also, it must frequently be brought up-to-date if, for example, the last figures are three or four years old.

- b. Recommendation: Increase networking and draft scope of work and RFP for new contract

More ESDB networking with its end users could help clear up data reliability and freshness issues. End users could help provide ESDB staff with the latest country data available for inclusion as part of ESDB information. ESDB, in turn, could supply end-users with regional or other data as needed.

The existing contract ends next spring. Since essential Agency services are provided under it, DI and AID Contracts should be drafting the scope of work and RFP for a new contract now. Particular attention should be paid to whether or not the level of effort should be increased (would budget constraints permit this?) and what skills will be highest priority under the new contract. We do not believe that activities under this contract will be affected greatly if the Agency moves toward creation of an expanded development information network.

C. AID's Existing Overall Development Information System

As noted in the sections above, our evaluation results are very positive. AID's development information system has improved significantly in recent years. It is now much more complete, organized (in computer format), efficient, and utilized than it was five or ten years ago. Credit for this goes to those who designed Project No. 930-0232, "Information as a Tool in Development," in 1976 and to those who have managed this project since, especially in CDIE/DI. The system includes central database and document services (DIHF), research and reference services (R&RS), to respond to queries and provide assistance, and the provision and analysis of basic economic and social data (ESDB) from developing countries.

DI and its predecessors have done a good job of accumulating in the DIS a significant part of AID's documentation. DI also cooperates with some of the other independent databases within the Agency to inventory and get their material into the DIS, e.g., WID, Housing, and PVO. And DI has established effective working relationships and often formal agreements for the mutual exchange of information with other development bodies, e.g., the World Bank, IDB, UNESCO, DAC, etc., and these commendable efforts continue. DI conducts a program to make the availability of this information known to potential users, and this has had considerable success. DI also sends certain information, e.g., basic country, economic and social data, to USAID Missions.

The development information system of AID is more advanced than those of most other national and international organizations that were reviewed, such as the World Bank and the Canadian International Development Agency. It is better organized, more widely used and broader in coverage than these other systems. AID also is making

important progress in ensuring that its own development experiences are documented, made widely accessible, and effectively linked with other sources of development information for use by AID staff and others.

DIHF, R&RS, and ESDB functions are performed for CDIE/DI by three private contractors, all of whom are doing a competent, professional job.

This progress and improved performance in the organization and use of development information by AID is viewed by nearly all observers including this evaluation team as commendable and important to AID's overall impact on socioeconomic development abroad. However, even with this excellent progress, we conclude that additional improvement in AID's development information effort is possible and important, especially in the areas of decentralization and networking and in further integrating development information into the information flows received and used by top AID management.

At present, DI has no control or coordinating authority regarding the generation, collection or systematic dissemination of development information in other parts of AID and there is no requirement that Bureaus and Missions cooperate with their program. Thus DI's current system, of necessity, emphasizes centrally performed operations (documents processing, database management, etc.) and user services (research, database searches, and document delivery), because DI has direct responsibility and control over these operations and services, and they are more economically performed at a centralized site. Although Bureaus and Missions now are outside the system's boundary, DI must depend on them for its supply of information to the system and its demand for services. Some Missions, e.g., REDSO/ESA and USAID/Ecuador, have information centers of their own and cooperate closely with DI; others seem to have little interest in participation in this centralized system.

As pointed out earlier, R&RS is now fairly centralized but could be more effective if made part of a larger network. DIHF services also could be improved if undergirded by a policy of more decentralized operations and supportive technology. Also, ESDB efforts could potentially be improved by more decentralization into a network supported by specific technology.

There is also evidence that AID is not managing development information as systematically as many other companies and agencies. As a result, it is not as far along in developing an overall system or network that enables useful development information to be at the right place at the right time for decision makers. Montgomery Securities of San Francisco, for example, talks of "information weapons". Such weapons are advanced information systems that provide companies with strategic competitive advantages by directly increasing the productivity, flexibility, and responsiveness of individuals, work groups and entire organizations. At the center of this concept is a new era of software applications heavily networked, highly intelligent and

operated by individual users. The technical foundation of such a concept is found in present corporate information networks³ that already combine voice, text, image and data at the work places of each relevant employee (e.g., the Nomura Securities network in Tokyo).

Also, AID's development information function serves principally technical professional staff whereas more advanced systems constantly link top management with critical information that helps enable increased productivity, better management control and improved decision making at all levels of the organization in carrying out overall strategy.

Managers are usually interested in results and in enhancing their knowledge level to deal more successfully with their environment. The information top organization managers need includes:⁴

- o Comfort information--a few daily notes on the existing state of the organization;
- o Internal operations information--operating, financial, strategic, control and structural data;
- o Outside dissemination information--a report or speech to be provided by a key subordinate;
- o Progress information--data about levels of achievement or excellence in meeting goals, needs of clients or beneficiaries, or concerns of sponsors or supporters;
- o Problem information--about a crisis or important issue that deserves attention and is of interest until the problem fades;
- o External intelligence--type and level of progress of others, technological break-throughs, changes in external political or economic factors, demand shifts for products or services, new project ideas, propaganda by others; and
- o Early warning information--trigger or alerting data about problems or issues.

Development information falls largely in the last four categories. Jackson points out some of this data is transitory and hard to provide effectively with computer technology which tends to emphasize formal information sources and formats. Thus, information systems aimed at

³Arnold & Keller, "The Rise of the Information Weapon," Infosystems, June 1987, p.22.

⁴Jackson, Corporate Information Management, p. 17 citing "Tools for Building an EIS," EDP Analyzer, vol. 17, No. 12 (Aug. 1979).

top management have to systematically integrate formal and informal development information sources into one network design which includes telecommunications and computer technologies.

These findings and conclusions, we believe, lead to the overall conclusion that AID's present development information system is not as efficient as it could and should be in providing critical development information to its decision makers world-wide when they need it, including top management in Washington and the USAIDs. Many AID projects and programs suffer as a result because personnel often are unaware of pertinent information, or much of it is not available in the right place at the right time in the right package, or they are not required to or choose not to consult it.

The principal reason for this state of affairs is that development information is not being systematically managed as a critical resource within the Agency. There is no overall plan or program that recognizes it as a resource and assigns responsibilities, obligations, and duties to all parts of the Agency to ensure that information is available on a timely basis to all users.

Acute awareness by AID's top management of the value of development information in its own right and as a means to increase the value of AID's other resources in achieving development impact is vital in this era of declining budgetary resources. Timely use of more of the right information and better handling of information will enable more development to be achieved with each dollar of foreign assistance. Sanyo Securities Company in Tokyo, for example, uses an integrated information system, including artificial intelligence structures, to forecast market trends, project exchange rate fluctuations and generate investment advice. Its communications/computer system has reduced back office support requirements to less than one person per sales representative when most firms require two people to support each sales representative.⁵

Information systems in organizations evolve in complexity as increasing numbers of users are prepared to access data and information directly. This end user computing is rapidly developing in organizations--resulting in a shared environment in which end users program their own systems, enter and share data and have responsibility for their own applications.⁶ This end user computing is usually

⁵Chorafas, Dimitris, "Is the Competition Ahead! Then Leapfrog Them," Computer World, July 20, 1987, p.57.

⁶Whereas traditional centralized data center or time sharing environments in corporations usually continue their growth, the end user shared environment has been growing explosively in some. In one oil company, for example, end user computer growth reached 12 percent per month while traditional environments were growing at only 15 percent per year. See Jackson, Corporate Information Management, p. 10.

carried out mostly by staff who perform program duties independently of the main data processing group; yet many of their applications have important departmental or interdepartmental uses⁷ and need to be disciplined by guidelines establishing appropriate languages, protocols, documentation, control procedures and support of such efforts. Many of these end users also want to be involved in the husbanding and management of the information relevant to their functions. These are healthy tendencies. They are reinforced by the dispersal of information technology in terms of personal computers and communications. Computerized digital PBXs can interconnect telephones, micro-computers, voice mail and other equipment around the world. LANs can internally link computers, graphics devices, fax machines and even PBXs into integrated services networks, resulting in distributed information systems in which rapid user-to-user information transmission in voice, data, graphic and written form is possible. However, these tendencies toward the dispersal of information and functions throughout organizations puts a strain on the basic centralized and hierarchical organizational model. Organizations normally cope with this problem by adopting plans, policies, and management structures that emphasize lateral relationships, such as coordination, networking, technical interchange, liaison, etc., that fully support development of a disciplined and widely distributed information system.

AID's development information system is evolving in this manner. There is ever increasing interest in, and use of, databases and computers (especially as younger personnel who are more "computer literate" join and rise in the Agency). As within USIS and as planned with the State Department's FAIS, end use computing and telecommunications are being more closely linked within AID as they already are in many corporate environments. The potential is great for building upon these and related circumstances to substantially increase the impact of development information on AID's overall effort. To accommodate further evolution and efficiency of its development information system, the Agency's top management should support:

- o Drafting and adoption of a policy statement regarding development information to focus attention and bring a disciplined approach to the management of information as one of the Agency's most critical resources;
- o Creation of an Agency-wide development information network (DIN) to enhance participation in development information capture, transmission and use by all AID members including top management; and

⁷See, for example, Spishak, Paul, "Program Decisions in AID: Using Automation for Management," Foreign Service Journal, Vol. 64, No. 3 (March 1987), pp. 22-23.

- c Provision of technical assistance to DIN nodes and other development information projects and activities.

D. Recommendations

1. Prepare and adopt AID Development Information Policy

The preparation and adoption of an Agency-wide development information policy in AID is important to improved utilization of this valuable resource. From this policy statement a set of common procedures would be derived. Major points in this policy statement would include:⁸

- The importance of development information as a resource to AID that assists in the creation and implementation of better plans, programs, and projects, and must be managed like any other resource;
- The vesting of overall responsibility for organizing, managing, and controlling this resource in AA/PPC. This person will be guided and assisted by an Agency Development Information Committee. He/she will utilize CDIE/DI, which is the Agency's central development information entity, to carry out his/her responsibilities;
- The establishment of a given development information budget that would be prepared, defended, and approved and managed like other Agency budget line items;
- The establishment of a more decentralized and collaborative system in which all AID/W and overseas units participate, to be called the Development Information Network (DIN) that will be built on the existing DI program;
- The recognition that CDIE/DI will continue to maintain the Agency's principle centralized development information database. Other specialized databases can continue to exist but must be directly related to, and integrated with the central database. A standardization program for all databases will be established so that terms, names, codes, symbols, etc., are consistent;
- The importance of AID staff and contractors seeking out and utilizing pertinent development information in the routine conduct of their operations and responsibilities. For example, documents such as CDSS's, PID's, project papers, etc., would all contain sections addressing this matter;

⁸See Annex 7 for further detail.

- Implementation of a thorough, effective, and timely information acquisition program, to assure that all information of interest and value is made part of the system promptly; and
- Conduct of periodic audits and evaluations to ensure that personnel are fulfilling their obligations to utilize and support the system, and that the system is effective and efficient and is serving its users well.

2. Create a Development Information Network (DIN)

The utility and effectiveness of the Agency's present development information system can be improved by further developing an increasingly integrated development information network similar to systems in many corporations. This is already underway in part within the LAC and AFR Bureaus which are establishing systems and units as part of a distributed information network.

The elaborated DIN concept is both virtual and physical. As a virtual network it is an internal AID "consortium", i.e. an organizational structure whose members (nodes) are autonomous in that they report to different organizational units of the Agency. For example, the development information center in the Latin America Bureau would still report to AA/LA, and the information center at REDSO/ESA would continue to report to the Mission Director. Specialized databases would still exist in the Agency. But all of these nodes would enter into a collaborative, participatory functional relationship with DI, and there would be an agreement to observe certain minimal levels of methodological and technological compatibility. The physical network would incorporate devices connected by a telecommunications system.

Mission information centers would be key elements of the DIN. They would provide dynamic information services for Mission staff and contractors, and selected host country users, and have responsibilities regarding document acquisition. They would operate within guidelines cooperatively established with DI, and avail themselves of technical and methodological support from DI.

DI would govern the DIN. It would provide technical and methodological leadership and coordination. It would also continue to perform certain functions centrally, e.g., network planning and development, central database management, and training, and provide services to users who are not linked to a node. The benefit of such a system is that development information would be available throughout the Agency on a timely basis to help in the creation and implementation of better projects and proposals.

The following four steps should be taken toward the end of creating the DIN. (See Annex 8 for a fuller description of these steps.)

- Elaborate the DIN Concept: Prepare a non-technical concept paper describing the purpose, rationale, and form of DIN, for consideration by the Agency's top management. This paper should cover such topics as: organizational and technological trends regarding the information resource; the present system; benefits of a network; structure of the network; discussion of sharing and division of functions and responsibilities between DI and the nodes; timetable and preliminary cost estimates; request for approval to proceed further. This paper could be prepared within three months. It might be completed and reviewed in conjunction with the Agency development information statement mentioned earlier, although neither is necessarily dependent on the other;
- Prepare DIN Node Models: Develop functional models of Mission and Bureau information nodes. Missions and other units vary in magnitude and activities and so will their information needs. The models should be sensitive to such variations without losing sight of the overall networking goal. The models should address the following: objectives; organizational structure; responsibilities of the nodes for document management, user services, and reporting; relationships to DI and other nodes, and to contractors and other users; and personnel requirements. Content and implementation of similar programs in other organizations should be reviewed as part of this step. These models could be completed in about three or four months following approval of the concept paper; and
- Design the DIN: This technical phase would examine technical modifications of the current DI system in light of ongoing and potential improvements in information technology. It would cover such items as: technical design; specifications of parts of the system in terms of parameters such as data volumes, flow rates, etc.; estimate of modification, installation, and operating costs; and a schedule for transition from DIS to DIN. We estimate that this could be completed in six to nine months assuming a senior professional effort equivalent to 12 man-months. Even if the Agency decides not to proceed with DIN or expand DI's responsibilities, study is still needed to identify changes and improvements within the present system, including software evolution.
- Provide for Consulting Services to DIN Nodes: As the methodological and technical hub of DIN, DI would have to provide broad support to the DIN nodes. This study should address DI technical assistance such as: establishment and

operation of information centers, including libraries; installation and use of technologies; awareness and marketing tools; training of personnel; drafting of manuals and handouts; assistance to projects having information components; assistance to Missions seeking to encourage LDC access to US information sources; cost estimates; and general trouble-shooting. It could proceed concurrently with the DIN technical design phase.

The four studies described above should be completed and approved before major changes are made in the current system. The estimated time required to complete, discuss, and approve all of them is about 18 to 24 months. Meanwhile, the current system should continue to operate generally as is, with marginal improvements taking place as planned. DIN development, including modification, procurement, and installation of equipment and training, would require an additional one to two years. A reasonably well performing DIN could be functioning within AID in four to five years.

ANNEX 1

Scope of Work

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ANNEX 1

ARTICLE III - SCOPE OF WORK

The following is a list of illustrative issues which will be examined in-depth by the contractor team during the evaluation to support the work order objectives. This set of issues will be further refined during the initial week of the work order. Priority will be given to performing analysis on tasks which will ensure that development information continues to play a strong central role in A.I.D.'s development assistance programs.

Development Information Activities

- o Data collection - What data is currently collected? Why, for whom and how is the process conducted? What are the data sources? What is the estimated cost of the collection process?
- o Data organization and processing - How is the data categorized and indexed? Who organizes the data, what methodology is used, and why? How expensive is this process? How is the data analyzed and synthesized for input to the system? Is this cost effective? Is the value-added product effective?
- o Data access and dissemination - Is the data access effective and efficient? How is data analyzed and synthesized prior to dissemination? What data is disseminated, how, by whom, in what form, how quickly and at what cost? Is the data disseminated upon request only, on an anticipated need, or otherwise?

Program Results and Impact

- o Uniqueness of information - Has the project made information available that was not available before or that is not available somewhere else? What constraints hinder its effectiveness in this area?
- o Organization of information - Does the project organize and process information in ways that are particularly relevant to its specialized end users? Is the same information organized in a similar fashion anywhere else? Are its approaches cost-effective? What are the constraints?
- o Dissemination of information - Does the project disseminate information that is of central importance to its end users? What proportion of its information qualifies in this way? Is the dissemination timely? What other characteristics of its dissemination activities are significant or unique enough to be noted as being an important part of its overall impact? Is the information dissemination program cost effective? What factors limit CDIE/DI's efforts to make its dissemination program vital to end users?
- o Information as a critical resource - Do the project's activities bring information into critical end user decisions

appropriately? Does it enhance the role of information in the development process for A.I.D. and developing country institutions? What aspects of its efforts have the most impact? What constraints inhibit the effectiveness of these activities? How much of CDIE/DI's potential to support the role on information in development is realized with the present program approach?

Appropriateness of Data and Activities

- o Data and information - Are the data resources accessed by CDIE/DI appropriate to the needs of end users? Are they appropriate to the needs of the Agency? Is the data of value to other potential users, who currently do not have access?
- o Products and services - Are the CDIE/DI information activities appropriate to the needs of end users? Are they supporting the needs of the Agency? Are they appropriate for the development community at large?

Cost Effectiveness of Activities

- o Effective data - Does the project's data produce an impact at an acceptable cost? Which portion of its data delivers the best price/impact ratio? Which data is least cost effective? What aspects of the data affect their cost effectiveness?
- o Efficient activities - Are the project's activities performed in an efficient manner? Are some functions completed more cost effectively than others? What aspects influence the cost effectiveness of certain operations? What deters CDIE/DI in its efforts to implement efficient programs?

Documented and Effective Demand

- o Past and present demand - What is the documented demand for CDIE/DI products and services? Where did this demand originate, and how was it encouraged to grow? On the basis of the current demand, what is the profile of the current market for CDIE/DI's data and services?
- o Future demand - What is the potential demand for CDIE/DI products and services? How can this demand be fostered? How expensive will it be to service this demand? How would CDIE/DI have to alter its operations to support this future demand? What limitations, beyond CDIE/DI's control, would inhibit its ability to service this larger potential market.

Structure and Management of Development Information Activities

- o Role of development information - What is the role of information in achieving the development objectives of A.I.D.? Is this role clearly defined, and is it one which frequently changes? How does the CDIE/DI information program fit into this role? What restricts CDIE/DI and the project

from fulfilling the objectives of utilizing information as a tool in development? What is CDIE/DI's role in the global development information network?

- o Management and organizational support - Are the current operations, organizational structures and management methods appropriate for CDIE/DI to fulfill the Agency's requirements for information as a resource in development programs? What constrains CDIE/DI management and staff from performing their tasks more successfully?

User Fees

- o Current user fee charges - To what extent are user fees employed by CDIE/DI to recover costs for services rendered? What factors influence user fee structures? What CDIE/DI products and services, currently not included in the user fee system, can be used to generate revenues in the present user community? What services would attract user fees in an expanded market base?
- o Future user fee system - To what extent must CDIE/DI rely on user fees for supporting future operations? What changes are required to achieve a viable user fee program? What start-up and maintenance costs will be associated with a user fee operation? Would these costs only be associated with recovering the costs of bringing the product to market, or would they also support improved products and services, market expansion, or quicker response time? Will a major user fee program be detrimental to the role of information as a resource in A.I.D.'s development efforts?

Information Management and Networking Activities

- o Role of information management - What is the role of information management in CDIE/DI's present activities? What additional information technologies and methodologies could be employed to make CDIE/DI's information program have a greater impact at less cost? What impact would improved information management techniques have on CDIE/DI operations effectiveness, timeliness, scale of operations, personnel and market demand?
- o Role of networking - What is the role of institutional and electronic networking in CDIE/DI's current program? What additional networking activities could be implemented which would have a significant impact on CDIE/DI and A.I.D. development efforts?

Policy Issues

- o Use of information by A.I.D. and its programs - How does the Agency currently use development information internally and to support program development objectives? Is the Agency employing information as an effective resource, development

and management tool? Is A.I.D. appropriately organized and managed to obtain the full benefits of appropriate information? What policies need to be altered to ensure that information plays an optimal role in A.I.D. and its development programs?

- o A.I.D. organization and CDIE/DI - How is the Agency presently structured to access, collect, organize, process and disseminate its development information resource? What is CDIE/DI's role in this structure? What modifications are needed in the present organizational system to improve the use and impact of development information by Agency staff and their development program counterparts?

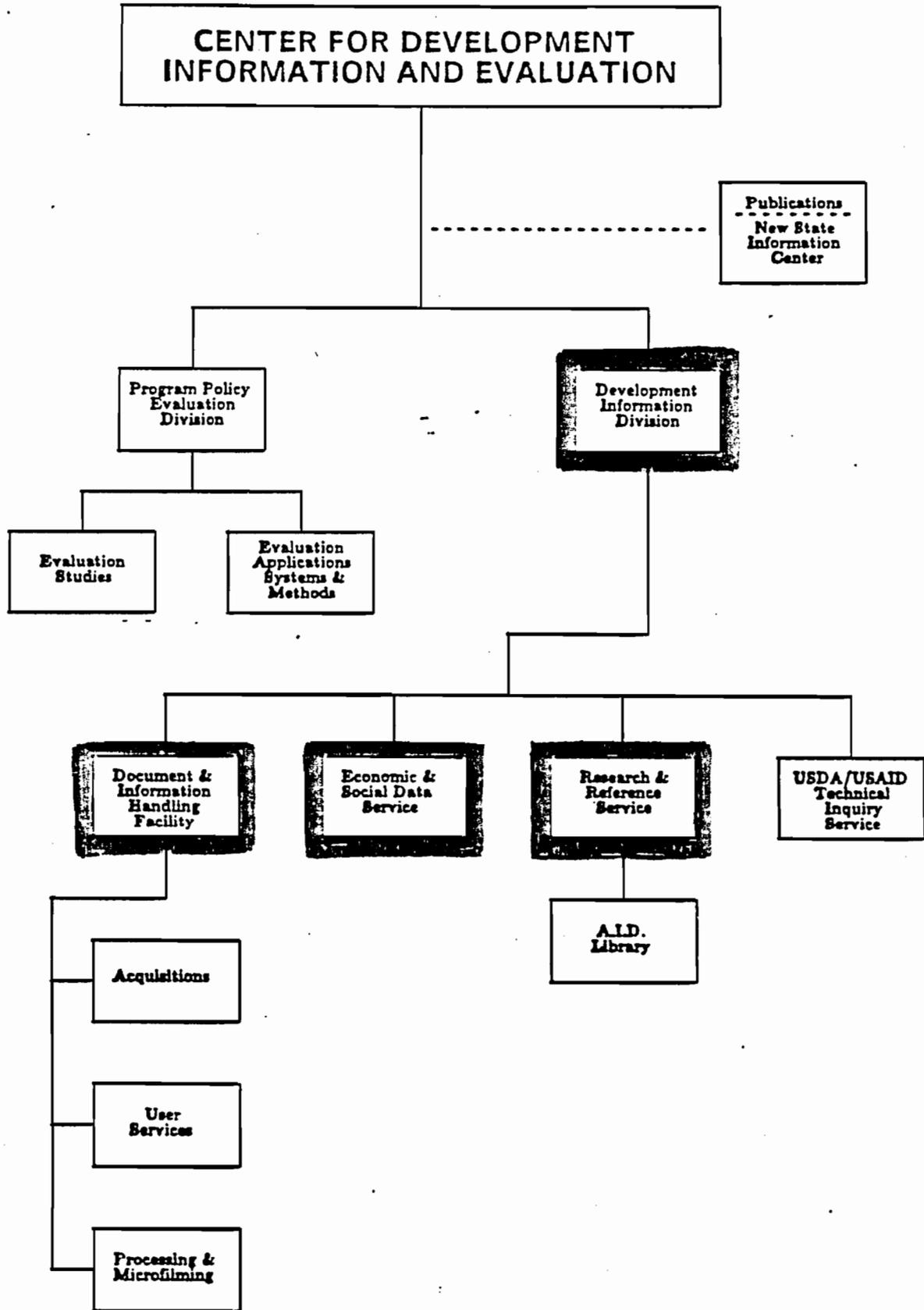
Future Program Directions for CDIE/DI

- o What is the future role of information in development for A.I.D. and its development activities? Is it very different from the current CDIE/DI program plans? What should CDIE/DI's contribution and activities be toward meeting this future demand? Who else should be involved and participating in fulfilling these needs? What CDIE/DI operational issues exist in meeting this future demand? What are the cost considerations? What A.I.D. policy issues must be addressed to support these new program directions?

In performing this evaluation, the contractor will conduct interviews with CDIE staff and contractors who support information services and products under the project. Interviews will also be conducted with A.I.D. staff, contractors and the public who are consumers of these services. The contractor will review appropriate management reports produced under the individual A.I.D. contracts funded by the project. An analysis of the existing information systems, products and services, their cost effectiveness and impact, and implications of a fee-for-service approach will be performed. Visits to three USAID field missions will be made to analyze A.I.D. staff, host country counterpart, and developing country institution needs for development information. A draft report will be prepared and presented at a one-day work shop to be held with the contract team and A.I.D. representatives to discuss the findings and recommendations of the report. Based on input from the work shop participants and comments from CDIE management, a final report will be prepared for submission to A.I.D.

ANNEX 2

CDIE Organizational Chart



ANNEX 3

Effectiveness vs. Efficiency of Information Systems

ANNEX 3

Effectiveness vs. Efficiency of Information Systems

This note discusses current approaches to measuring the cost effectiveness and cost efficiency of information systems and services.

Cost Effectiveness

Investments in information systems and services tend to be nontrivial, and the management of organizations which operate or use them invariably asks for evidence of the "cost-effectiveness" of these systems and services. The elusive nature of such evidence is often cited as the major cause of management's skepticism regarding benefits of information technology. The first observation to make is that the feasibility of determining cost effectiveness depends significantly on the nature of the organization.

In manufacturing organizations, it is relatively straightforward to show if and how the introduction of information technology will affect the organization's financial performance. A recent study has documented over 100 computer applications with verifiable financial payoffs such as reduction of operational costs, increase in production, accelerated revenue, etc.

The usual way of measuring cost effectiveness of investments in information technology in manufacturing organizations is to relate these investments to production outputs. One such method, called a "direct output" technique, is based on interpretations of financial data by standard accounting methods similar to decisions regarding capital investment. When changes in production outputs cannot be assessed directly, two "indirect output" measures may be used: Bayesian probability techniques, applied on the assumption that more information implies the probability of better decisions (and hence financial gains); or a consensus technique in which knowledgeable individuals formulate quantitative expectations of specific benefits that they believe will result from particular applications of information technology. Both of these "indirect output" techniques have flaws: in the Bayesian approach, evidence does not support unequivocally the assumed relationship between information and decisions; and the consensus technique is highly subjective.

Justifying the cost effectiveness of information systems and services in non-manufacturing organizations is more complex. The activities of such organizations typically do not generate products that can be easily related to revenues or sales; rather, these activities are of the problem-solving and decision-making kind, often referred to as "white-collar" work. With respect to white-collar activities, the concept of effectiveness relates to two aspects: their productivity, and their quality.

When and how can productivity and quality of mental work be measured and related to the cost of information systems and services? In principle, this is feasible when such work produces some physical output that is related to the presence or absence of information or information systems, and can be analyzed. The output of science, for example, are publications containing results of research; for these, a function exists (so-called "citation half-life") that measures the average currentness of authors in a discipline with respect to already published literature. It is plausible to argue that this measure is related to the status of information services. The cost effectiveness of such services is then the relation between their cost and the savings in research investments that result when the scientific community is more up-to-date with respect to existing knowledge. (Note that this measure is unrelated to the quality of the scientific work.) The underlying premise is that information systems and services are means to improve the effectiveness of societal or organizational investments.

When the output of mental activity is not physical (e.g., documents) and its quality not easily measurable, the cost effectiveness of information systems and services is estimated by actual or expected changes in human productivity. For example, labor displacement resulting from applications of information technology is usually viewed as a benefit of such applications (note, however, that there may be numerous other ramifications of such labor displacement--on work quality, on other employees, etc.--that this simple measure ignores). A more meaningful evidence of increased white-collar effectiveness is shift in work patterns; greater portions of work-day spent in professional activities, and less time on clerical and non-productive work. Assessments of the trade-offs between applications of information technology and effectiveness of activities in non-manufacturing environments are time-consuming, requiring a detailed classification and logging of employees' activities per unit of time, and involving complex mathematical calculations.

To conclude: aside from the intensive effort required by work value analysis--which we were not in position to undertake because of time and budget limitations--the current state of the art in cost benefit analysis lacks adequate methods for determining, quantitatively and objectively, the cost effectiveness of the DI activities in general, and of its document-handling and information service functions in particular. Informally, numerous statements of the positive utility of the service were made by persons interviewed during the course of our study, both in Washington and overseas. One must also intuitively accept the fundamental need of the Agency to have an "institutional memory" that is well organized and easily accessible to its staff. As described elsewhere in this report, the growing acceptance of the concept of management of information by the private as well as public sectors is persuasive evidence of the widening recognition of new and important roles of information in organizational strategies.

Cost Efficiency

While the cost effectiveness of information activities is very difficult if not impossible to determine objectively at this time, principally because such determinations involve measuring the elusive effectiveness of mental activities in human organizations, one should be able to answer the question "How efficiently are the information activities performed?"

Efficiency of information systems and services can be determined at two levels: as the change in the costs of performance of a given function over a period of time; and as the differences in the costs of performance of the same function in two or more different but similar information systems or services.

In this present study we have illustrated both approaches. On the one hand, we compared selected costs of the document-handling operation of DI with those of two other public-sector document-processing systems: the National Technical Information Services (NTIS) of the US Department of Commerce, and the ERIC Processing and Reference Facility operated under contract for the US Department of Education. We found that DIHF compared favorably with both NTIS and ERIC. On the other hand, we assessed the changes in efficiency of R&RS information services of over the three-year period 1984-86, and found efficiency had improved.

These assessments of efficiency are comparative, and such relative; they do not provide absolute measures. Understandably, the results depend on the degree to which the processes or events are similar and therefore comparable, and on the goodness of the data used in the comparisons. We were not in position to determine the validity of the data made available for this purpose, and hence it is prudent to assume that the results contain some margins of error. Thus our results should not be viewed as definitive. But they do establish a framework for future consideration.

ANNEX 4

CDIE Cost Data

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ANNEX 4.

DISTRIBUTION OF CDIE/DI FY86 DIRECT-COSTS BUDGET BY ACTIVITY

	DI	%	DIHF	%	R&RS	%	P/W	%	TOTAL	%
ADMINISTRATION	164,560	48.4%	267,786	16.2%	228,060	42.0%	10,000	5.0%	670,406	24.5%
General Management	90,100	26.5%	89,262	5.4%	152,040	28.0%	10,000	5.0%	341,402	12.5%
Contractual	24,820	7.3%	57,855	3.5%	10,860	2.0%	-	-	93,535	3.4%
Marketing, Advertising	24,820	7.3%	26,446	1.6%	38,010	7.0%	-	-	89,276	3.3%
Internal Analysis	24,820	7.3%	94,221	5.7%	27,150	5.0%	-	-	146,191	5.3%
TECHNICAL SERVICES	-	-	980,229	59.3%	-	-	60,000	30.0%	1,040,229	38.0%
AID Document Acquisition	-	-	105,792	6.4%	-	-	-	-	105,792	3.9%
Document, Econ. Data Processing	-	-	381,843	23.1%	-	-	30,000	15.0%	411,843	15.1%
Computer, DBMS Operation	-	-	247,950	15.0%	-	-	30,000	15.0%	277,950	10.2%
Microfilm Production, Inventory	-	-	105,792	6.4%	-	-	-	-	105,792	3.9%
Database Publishing (ARDA)	-	-	137,199	8.3%	-	-	-	-	137,199	5.0%
USER SERVICES	175,100	51.5%	404,985	24.5%	323,085	59.5%	130,000	65.0%	1,033,170	37.8%
Library Maintenance, Circulation	-	-	-	-	48,870	9.0%	-	-	48,870	1.8%
Reference Desk	-	-	-	-	70,590	13.0%	-	-	70,590	2.6%
Database Searching, SDI	-	-	-	-	89,595	16.5%	-	-	89,595	3.3%
Research, Special Studies	-	-	-	-	81,450	15.0%	40,000	20.0%	121,450	4.4%
Document Repro., Distribution	-	-	233,073	14.1%	10,860	2.0%	-	-	243,933	8.9%
Database Repro., Distribution	-	-	-	-	-	-	50,000	25.0%	50,000	1.8%
Training	49,980	14.7%	47,937	2.9%	13,575	2.5%	20,000	10.0%	131,492	4.8%
Consulting	125,120	36.8%	123,975	7.5%	8,145	1.5%	20,000	10.0%	277,240	10.1%
FY 1986 BUDGET (\$)	340,000	100.0%	1,653,000	100.0%	543,000	100.0%	200,000	100.0%	2,736,000	100.0%
FY 1986 BUDGET EFT	-	-	31.2	-	18.0	-	4.0	-	-	-

Sources: CDIE; LTS Corp; AED; Price-Williams

ANNEX 4

FY 1986 DISTRIBUTION OF DI FUNDS* BY ACTIVITY TYPE

	DI		DIHF		RRS		PW		Total	
	\$	%	\$	%	\$	%	\$	%	\$	%
Administration	164,560	48.4%	267,786	16.2%	228,060	41.6%	10,000	5.0%	670,406	24.5%
Tech Services	-	-	980,229	59.3%	-	-	60,000	30.0%	1,040,229	37.9%
User Services	-	-	233,073	14.1%	298,650	54.5%	90,000	45.0%	621,723	22.7%
Training/Consulting	175,100	51.6%	171,912	10.4%	21,720	4.0%	40,000	20.0%	408,732	14.9%
Total	339,660		1,653,000		548,430		200,000		2,741,090	

*Labor overhead not included.

ANNEX 5

DIHF Unit Operations Costs, FY 1986

ANNEX 5

DIIIF Unit Operations Costs,^a FY 1986

Activity Unit	Total # Hours	Average Hourly Labor/Oil Costs	Total Labor Costs	Other Dir. & Indlr. Costs	# Units Produced	Units Per Hour	\$/Unit	Comments
Acquisitions	3,908	\$11.32	\$44,251.59	\$64,700.00	9,793	2.51	\$13.06	Includes 248 non-AID titles
Cataloguing/Processing	10,639	\$10.78	\$114,709.70	\$54,650.00	18,560	1.74	\$12.09	Includes 9281 dup checks & DB Cat Changes
Abstracting/Indexing	9,040	\$9.25	\$83,638.08	\$78,360.00	6,377	0.71	\$31.02	Includes 4667 Index-only documents
DIIIF Micrographics	4,931	\$7.19	\$35,470.33	\$53,000.00	48,987	9.93	\$2.21	Represents total # fiche Dist for 4669 Documents
Document Delivery (paper)	8,750	\$7.30	\$63,904.17	\$182,000.00	71,675	8.19	\$3.93	
Document Delivery (fiche)	654	\$6.78	\$4,434.12	\$14,300.00	1,675	2.56	\$12.67	
Thesaurus Maintenance	1,624	\$11.67	\$18,952.08	\$12,740.00	144	0.09	\$275.36	
DBMS Software	6,000	\$14.26	\$85,530.00	\$89,000.00	61,007	10.17	\$3.35	Represents support per log-on hours
Computer Operations	1,957	\$8.50	\$16,634.50	\$73,774.00	15,600,000	7971.38	\$0.01	Represents support per lines printed
Training/Consulting	6,131	\$17.57	\$107,721.67	\$56,000.00	1,750	0.29	\$119.41	Represents costs/per person to brief or train
ARDA Publishing/Printing/Dist.	839	\$14.52	\$12,182.28	\$81,750.00	3	0.00	\$33,016.28	Includes printing, postage & composition
Other Publishing	1,264	\$11.48	\$14,510.72	\$47,102.00	10,083	7.98	\$6.71	Includes camp, repro & distribution
Management	9,203	\$20.73	\$190,778.19	\$53,144.00				
	64,940		\$792,717.43	\$860,520.00				

^aLabor overhead not included.

Source: ITS Corporation

ANNEX 6

Document Processing and Technological Change

ANNEX 6

Document Processing and Technological Change

Figure 6-1 shows the process flow of the existing DI document-handling system. The text of documents issued by the Agency is generated invariably in machine-readable form. Documents are introduced into the document-husbanding process in printed format, however, not on electronic media. A copy of the printed document is forwarded to DI for inclusion in the AID database. After processing (descriptive cataloging, abstracting, and indexing at DIHF), an electronic surrogate of the document is created and added to a machine-readable database of such documents. The printed document is then microfilmed and archived.

Documents generated by AID contractors are treated in similar manner, except that the original electronic copy is not necessarily prepared by using the Agency's word-processing standards (and sometimes may not be generated electronically but typewritten instead). As a result, contractors' documents also reach DI on paper medium. Their subsequent handling is identical to AID-produced documents: bibliographic processing, generating a surrogate on electronic and paper media, microfilming the full document, and archiving it in both microfilm and on paper.

The upshot of all this is that AID-generated documents exist in the Agency in their entirety on three storage media: electronic, paper, and microfilm. In addition, document surrogates are stored on two media: electronic (database) and paper (ARDA). For users requesting documents, copies are generated by photocopying the archived paper copy, photographically enlarging the microfilm and printing it on paper, or duplicating a microfiche.

Before examining the possibility of rationalizing this mix of information forms and media it is interesting to understand how and why it came about. For centuries paper has been the sole carrier of visually perceivable information. Early this century microfilm became a relatively popular medium for document archiving because of its attractive storage cost, compared with the storage cost of paper, and because of the economy of duplicating microfilms. These advantages have been partially offset by user disaffection with this medium, which requires special devices for document reading. As a result, microfilm has failed to replace paper for archiving narrative documents (in contrast to some other documents such as catalogs).

The initial non-numeric application of electronic technology in the 1960's sought to automate the printing of "secondary" publications (abstracting and indexing journals). Gradually, electronic databases were built up in this manner; however, the printed abstracting and indexing journals did not disappear but became a by-product of the

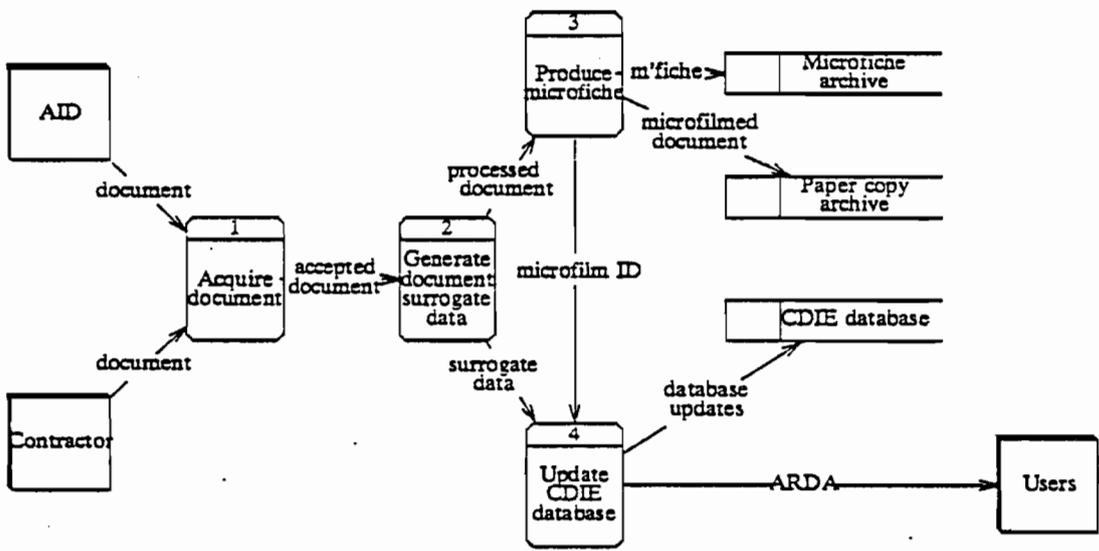


Figure 6-1: Current System

electronic form (to be used increasingly as a current awareness tool rather than a document location device). The advent of text processing made it possible to create the document itself in machine-readable form; it too did not fully replace the paper document because this technology was unable to create, store and transmit economically non-textual materials (images, graphs, pictures).

Thus although the micrographic and electronic technologies added new functional options and alternatives to document-based information systems, they did not replace paper as a storage medium. Thus in many systems documents are archived on all three media.

During the past two years, two significant technological developments have reached the market which jointly offer the possibility of changing this situation. One of these is digital imaging technology whose applications (e.g., in desktop publishing) generate the master copy of entire documents (both text and nontextual materials) directly in electronic form. Such a copy may then be stored or transmitted electronically, and of course converted to paper.

The second development is optical storage technology, which permits the digital storage of the entire range of information carriers: data, text, image, video, and voice can now be integrated relatively economically in a single system. For document-based information systems, the optical disk has additional advantages over micrographics: it can store text digitally (as images of pages), or as machine-recognizable symbols (words), which can be mechanically searched and manipulated; it has very high storage capacities (on the order of 600 to 2,000 Mbytes); and excellent durability. Some analysts predict that by end of this year the number of optical storage systems sold will surpass the sales of micrographics systems. Pioneering applications of these new technologies by government agencies such as the Patents Office and the National Archives and by private industry are being widely reported.

These new technologies make it possible to rationalize further the management of information forms and media in document-based information systems. In the DI environment, optical technology has the potential of replacing, in full or in part, other media of archival storage of documents and document surrogates, and of becoming a means of document dissemination and local on-demand reproduction. One possible structure of a document information system utilizing optical storage technology is shown in Figure 6-2. It is emphasized that this is an illustration only, and that the design of an optimal mix of archival media for the DI information system, and the consequences of such a mix on information services, requires careful study.

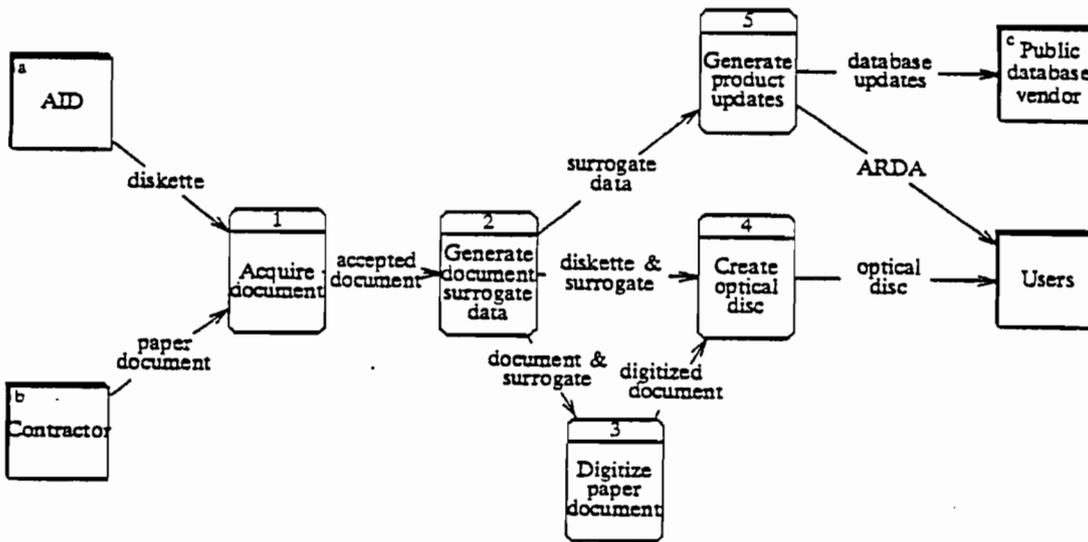


Figure 6-2: Proposed System

ANNEX 7

Thoughts Regarding an AID Development
Information Statement or Policy Paper

ANNEX 7

Thoughts Regarding an AID Development Information Statement
or Policy Paper

Development information encompasses many disciplines of human knowledge and is located in numerous places. Thus there is danger that a written statement or policy paper will be so lengthy and general as to be useless. But this can be avoided. The statement could encompass the following points in approximately this order:

- o Define development information and pertinent Agency and non-AID forms and sources of such information. This information is a resource akin to other resources like personnel and money. If available and wisely used, it assists in the creation and implementation of better plans, programs, and projects. Conversely, plans, programs, and projects suffer greatly if pertinent information is not accessed and used. Never "recreate the wheel";
- o Development information is not a free good. It has costs to acquire and maintain, and has differing values at different points in time. Therefore, it must be managed like any other resource;
- o AID now is upgrading its treatment of this resource. Overall responsibility for planning, organizing, managing and controlling it is vested in AA/PPC. This official will utilize CDIE/DI, which is the Agency's central development information entity, to carry out his responsibilities;
- o He will be guided and assisted by a Development Information Committee of involved and knowledgeable officers. These officers will designate subordinates as their working liaisons with CDIE/DI;
- o The development information resource will be managed within a given budget like other resources. This budget must be prepared, defended, and approved like other Agency budgets. A better managed, more widely and wisely utilized development information system will not necessarily be a financially more expensive system;
- o A "need to know" policy will be established for development information. Although generally information should be widely shared, not everyone need have access to everything. This is especially true for classified or sensitive information, for which special controls will be adopted;

- o The Agency will move toward a more decentralized and collaborative system in which all AID/W and overseas units participate, to be called the Development Information Network (DIN). This will build on the existing Development Information System (DIS), in which other AID/W units and Missions are viewed primarily as clients and users rather than as participants;
- o AID will utilize appropriate telecommunications and computer hardware and software for its system. Although machinery is a means and not an end in itself, nevertheless it is the technological capability of computers that makes possible the rapid and timely dissemination and use of great amounts of information;
- o CDIE/DI will continue to maintain the Agency's main development information database. Other specialized databases can exist as now, but must be directly related to and integrated with the central database. Information must be shared and be generally available for access and use, and overlap and duplication avoided;
- o The Agency will designate specific officers to be development information specialists;
- o A development information standardization program for all forms of information will be established so that terms, names, codes, symbols, etc., are as consistent as possible;
- o Development information of other development organizations such as the World Bank, UN system, bilateral donors, etc., and other U.S. Government and commercial databases, will be accessed as useful. AID's development information will be shared with these organizations as possible;
- o AID also will make its database available to the public through U.S. Government and/or private commercial outlets;
- o Establishment of an Agency Management Information System (MIS) will be considered, to comprise timely development information of direct pertinence and use to Agency managers;
- o AID officers, contractors, and consultants are required to seek out and utilize pertinent development information in the conduct of their operations and responsibilities. Documents such as CDSS's, strategy papers, PID's, project papers, etc. must contain sections addressing this matter;

- o AID officers, contractors, and consultants are required to support the system in all reasonable ways. It is especially important that all development information of interest and value be incorporated into the system promptly; to achieve this a strong acquisitions program will be drafted, adopted, and implemented;
- o Training and awareness programs will be instituted at all levels to ensure that personnel are cognizant of how to utilize the system, and of their accountability and responsibilities toward it;
- o Audits and evaluations will be conducted periodically to ensure that personnel are fulfilling their obligations to utilize and support the system, and that the system is effective and efficient and is serving its users well; and
- o Information in the system will be removed (perhaps archived) from time to time when it is outdated or no longer useful, just as resources such as personnel and equipment are transferred or "retired". Information in the system should be current and useful. It is costly to maintain unnecessary information.

ANNEX 8

Suggested Steps Toward Creation of the
Development Information Network (DIN)

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Suggested Steps Toward Creation of the
Development Information Network (DIN)

Information systems inevitably evolve over time, and the need for their modification is neither an anomaly nor evidence of faulty design but a natural, organic phenomenon. They evolve primarily in response to two interacting factors: the changing needs and/or desires of the user community, and the expanding capabilities of the information technologies. New technological developments that are found useful and affordable foment new applications; the latter in turn affect the information system's structure, functions, resources, and behavior.

The present CDIE/DI system for husbanding the recorded information resources of the Agency is performing creditably its assigned or assumed functions. The Agency, however, needs to be concerned with increasing the system's utility by intensifying the effective use of information and knowledge throughout its problem solving and decision making activities.

Our recommended approach toward this objective is to create, at each physical problem-solving site, an environment that induces an increasingly intimate integration of information-support functions into purposive professional activities of the AID community. At present, such an environment exists only at a few sites, partially as a result of informal endeavors of DI. We believe that the Agency requires a more formal program to promote this objective. The purpose of this recommendation is to outline such a program in the form of an AID Development Information Network (DIN), to be created over four to five years. We suggest that the following four steps be taken:

1. Elaborate the concept of the AID Development Information Network
DIN

Develop a non-technical concept paper succinctly describing the purpose, rationale and form of the Development Information Network, for presentation to and approval by top AID management. The Agency's decision will determine the scope of subsequent efforts by DI, and the manner in which they will be carried out.

The elements of such a paper include:

- An introduction describing current organizational and technological trends in the distribution of information resources so as to integrate them into everyday problem solving and decision making;

- A description of the network as an innovative organizational model (compared with present status) for improved management and exploitation of information resources, and its benefits to the organization (e.g., better projects and programs, standardization, coordination, economy);
- An outline of the structure of the proposed Development Information Network: its member nodes (initially and potential), their autonomous character, and the participatory governance of DIN by DI;
- A general idea of the sharing and division of functions and responsibilities between the nodes and DI, and of the expanded assistance to be provided by DI to the nodes;
- A general idea of the ongoing technological evolution in the Agency that DIN will assist;
- An overall timetable and schedule of major milestones for implementing DIN; and
- A request for approval or endorsement of the DIN concept, and of specific follow-up steps within a given time framework (e.g., formation of an ad hoc planning group).

A reasonable period for preparing this paper is three months.

2. Prepare models of DIN nodes

Approval of the DIN concept modifies the present status by making DI "officially" responsible for the guidance of the development information system in DIN nodes in AID/W and Missions. To provide such guidance, DI should develop functional models, of Bureau and Mission information systems and services. Understandably, AID/W units and Missions vary in the magnitude and range of their activities and hence information needs, and their current practices may be neither identical nor entirely compatible. The models should be sensitive to such variations while not losing sight of the networking goal.

The major areas such models should address are the following:

- A statement of the centers' objectives and their autonomous nature;
- The recommended place(s) of the information center in the organizational structure;

- Responsibilities of the center for internal document management (e.g., correctness of bibliographic formats, acquisition, cataloging, storage, etc.), user services (e.g., current awareness, database searching, document reproduction or delivery, library services, etc.), and administrative reporting;
- External responsibilities of the center vis-a-vis DIN (including DI and other nodes), AID contractors, and other users; and
- Desirable or minimal standards for center staffing, staff qualifications, and space.

The models do not include discussions of technical standards (e.g., for cataloging, database formats) and information technology support; their intention is to make clear the purposes and structure of professional information services in each DIN node.

The development of models can be completed in about three or four months following approval of the concept paper.

3. Design the DIN Information System

We assume that the Agency has concurred with and approved the DIN concept paper, and has authorized DI to proceed. The first technical phase of the project is to examine desirable modifications of the current DI information system in the light of opportunities offered by both networking and developments in information technology.

The elements of such a study are:

- Development of a structured design for the system;
- Specifications of the various systems entities (processes, data flows and stores) in terms of parameters such as data volumes, flow rates etc.;
- Formulation of performance specifications of appropriate technologies for information processing, storage and communications, and of appropriate software;
- Estimate of cost for development and installation of such a system, and of its operating costs; and
- Preparation of a plan and schedule for the transition from current operations to DIN. (The transition phase will involve a certain amount of system development work if, as expected, new technologies and/or software are introduced).

A design-study is desirable even in the event that the Agency fails to support the concept of a Development Information Network or extend the present responsibilities of DI. In such case it would concern itself with improvements in the existing system and services that lie within the present DI mandate.

Although this study represents a nontrivial effort, it is not expected to specify detailed procedures (e.g., extensive computer program specifications, data structure formats, etc.). DIN will utilize existing information processing standards, devices, and software. The specification and design of procedures or products that are device or software dependent (e.g., input forms, reports, etc.) will be carried out during the development phase. For these reasons we estimate that the design study can be completed in six to nine months, given a senior professional effort equivalent to 12 man-months.

4. Provide for consulting services to DIN nodes and other development information projects and activities

As the methodological and technical hub of DIN, DI needs to assume a substantially broader and more formal role of support to the DIN nodes and to other development information systems in AID-related projects and activities, so as to assist them in carrying out effectively their functions. It will need to identify the nature of these services, develop their content, identify instructional materials, write and pretest manuals and handouts, evaluate the desirable qualifications of personnel involved in these activities, and prepare estimates of the frequency, volume, schedule, and cost of the activities. It is assumed that such services will be contracted by the Agency.

DI support services are indicated in the following areas:

- Establishment and operation of information centers in DIN nodes, including their libraries;
- Effective use of expanding information technology in information center environments;
- Techniques and ways of marketing information services to the DIN node clientele;
- Guidance of development projects sponsored by Missions that have information service components; and
- Guidance to Missions seeking to increase LDC access to US information resources.

This project should be timed to run concurrently with the initial phase of DIN development, following the completion and acceptance of the DIN design document. Although its duration is somewhat flexible, depending on the length of the DIN development period, one must remember that installation of information functions into DIN nodes presumes the availability of knowledgeable personnel.

The above recommendations concern four studies that we recommend be completed before the actual installation of new or modified processes, procedures, and devices. Time required to complete, discuss, and approve all of them we estimate at about 18 to 24 months. DIN development, including modification, procurement, and installation of equipment and training, would require an additional one to two years. A reasonably well performing DIN could be functioning within AID in four to five years.

ANNEX 9

List of Individuals Met, Positions and Affiliations

ANNEX 9

List of Individuals Met, Positions and Affiliations

CDIE and DI's Contractors

North, Haven	PPC/CDIE Associate Assistant Administrator
Goddard, Paula	PPC/CDIE Deputy Associate Assistant Administrator
Brown, Maury	Chief of CDIE/DI
White, Lee	Deputy Chief of CDIE/DI
Amendola, Sandra	PW
Baker, Robert	PW
Balsis, Catherine	AED Director
Betts, Ardith	AED, Senior Librarian
Booth, J.M.	LTS Project Director
Clift, Menilee	LTS
Dembowski, Don	Economist, Head of ESDS
Duffy, Sean	AED
Gaul, Robert	Special Assistant
Godiksen, Lois	CDIE/PPE
Harold, Jim	AED
Keyes, Karen	AED
Mara, Ruth	AED Deputy Director
Pope, Margaret	Reference Services
Tifft, Jeanne	AED
Vadas, David	LTS
Wilson-Romero, Tina	LTS

AID excluding CDIE

Bissell, Richard	Assistant Administrator, PPC
Almaguer, Frank	Director, USAID/Ecuador
Ayling, Mrs.	Librarian and Records, USAID/Chad
Bernstein, Linda	Project Officer, REDSO/ESA, Kenya
Bertolin, Gordon	Project Officer, USAID/Kenya
Callison, Stuart	Chief Economist, REDSO/ESA, Kenya
Chapman, Tom	Development Officer, USAID/Ecuador
Colyer, Dale	Development Officer, USAID/Ecuador
Donnelly, Tom	Latin America Bureau, DR
Faught, William	Agriculture Officer, REDSO/ESA, Kenya
Fritz, Paul	Director, USAID/Uruguay
Gordon-Smith, Kathy	Librarian, REDSO/ESA, Kenya
Hjelt, Christine	Librarian, REDSO/ESA, Kenya
Jeffers, William	Project Officer, REDSO/ESA, Kenya
Kernan, Bruce	Development Officer, USAID/Ecuador
Langhaug, Anne	Director, Mission Information Center, USAID/Ecuador
Maldonado, Patricio	Program Officer, USAID/Ecuador
Mariani, Nick	Program Officer, USAID/Kenya
Meriweather, Neal	Executive Officer, USAID/Ecuador

O'Keefe, Tom
Rhoad, David
Roeser, Randy
Shah, Satish
Singer, Derrik
Spishak, Paul

Stansley, Philip

Budget Officer, PPC
Food-for-Peace Officer, REDSO/ESA, Kenya
USAID/Ecuador
Director (Acting), REDSO/ESA, Kenya
Human Resources Officer, USAID/Kenya
Director, Office of Information Resources
Management, Bureau for Management
Contractor with APROCIKO, Ecuador

Other U.S. Government

Bakken, Jeff
Brandhorst, Ted

Burt, Flo
Davis, Betsy
Green, Barry
Guzman, Francisco
Post, Frank

Wetmore, P.

Associate Director, Peace Corps, Ecuador
Director, ERIC Processing and Reference
Facility, Washington, D.C.
Librarian, Peace Corps, Ecuador
Director, Peace Corps, Ecuador
Peace Corps, Ecuador
Deputy Director, Peace Corps, Ecuador
Director, NTIS Office of International
Affairs, Washington, D.C.
USDA

We also talked with library staffs at the State Department, Commerce
Department, USDA, and Fairfax and Arlington Counties, Virginia.

Public Officials excluding U.S. Government

Aguilar, Arq Rodrigo
Alot, Magaga
Alvarado, Loda de
Bloomfield, Robert
Egas, Srta Mariana
Gavin, Terry
Howell, Hunt

James, Carlton
Magnusson, Mik
Moore, Maureen
Murphy, J.
Ngatia, Mrs. and staff
Nsubuga, Naah and library staff
Nyia, Zerubabel M.
Ortega, Jorge Sosa
Ortega, Remedios
Sekyewa, M. and staff
Stone, M.
Velasquez, Jaime

SINICYT, Government of Ecuador
UNDP, Kenya
CONADE, Government of Ecuador
World Bank, Washington, D.C.
FAO, Ecuador
IDRC, Ottawa, Canada
Inter-American Development Bank,
Washington, D.C.
UNEP, Kenya
INFOterra, UNEP, Kenya
World Bank, Washington, D.C.
World Bank, Washington, D.C.
Librarian, ILRAD, Kenya
ICIPE, Kenya
ICIPE, Kenya
Professor, FLACSO, Ecuador
ICIPE, Kenya
World Bank Regional Office, Kenya
IDRC, Ottawa, Canada
Professor, Ecuador

Private

Burbridge, Terry
Heuzog, John

Coopers and Lybrandt, Ottawa, Canada
Ottawa, Canada

We had discussions with officers associated with the following companies that preferred not to have their names included in this report:

Balfour Corporation
General Electric Company
Mobil Oil
Raytheon Corporation
Texaco Oil

ANNEX 10

Bibliography

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ANNEX 10

Bibliography

The literature on information is large and growing rapidly. Below is a selected list of pertinent non-AID books and articles, plus seven periodicals that frequently print articles on this topic. All of these were consulted by us in researching and preparing this report. We have not included in this list the many AID reports and materials we consulted which are in the CDIE files.

BOOKS

- Cleveland, Harlan The Knowledge Executive: Leadership in an Information Society. Truman Talley Books. New York, New York, 1985.
- Davis, Gordon B. and Margrethe H. Olson. Management Information Systems: Conceptual Foundations, Structure, and Development. McGraw-Hill Book Company. New York, New York, Second Edition, 1985.
- Diebold, John. Business in the Age of Information. American Management Association. New York, New York, 1985.
- Diebold, John. Managing Information: The Challenge and the Opportunity. American Management Association. New York, New York, 1985.
- Emery, James C. Management Information Systems: The Critical Strategic Resource. Oxford University Press. New York, New York, 1987.
- Guth, William D. Handbook of Business Strategy. Warren, Gorham and Lamont. New York, New York, 1985.
- Jackson, Ian. Corporate Information Systems. Prentice-Hall. New York, New York, 1986.
- Kroeber, Donald W. and Hugh J. Watson. Computer-Based Information Systems: A Management Approach. Macmillan Publishing Company. New York, New York, 1984.
- Kroeber, Donald W. Management Information Systems: A Handbook for Modern Managers. The Free Press (a Division of Macmillan Publishing Company, Inc.). New York, New York, 1982.
- Lucas, Henry C. Information Systems Concepts for Management. McGraw-Hill Book Company. New York, New York, 1986.

- Meyer, N. Dean and Mary E. Boone. The Information Edge. McGraw-Hill Book Company. New York, New York, 1987.
- Murdick, Robert G. and Joel E. Ross. Introduction to Management Information Systems. Prentice-Hall, Inc. Englewood Cliffs, New Jersey, 1977.
- O'Brien, Rita Cruise. Information, Economics and Power: The North-South Dimension. Hodder and Stroughton. London, England, 1983.
- Porter, Michael E. Competitive Strategy. Free Press. New York, New York, 1980.
- Radford, K.G. Information Systems for Strategic Decisions. Reston Publishing Company, Inc. (a Prentice-Hall Company). Reston, Virginia, 1978.
- Ross, Joel E. Modern Management and Information Systems. Reston Publishing Company, Inc. (a Prentice-Hall Company). Reston, Virginia, 1976.
- Sprague, Ralph H. and Barbara C. McNurlin. Information Svstems Management in Practice. Prentice-Hall. New York, New York, 1986.
- Synnott, William R. and William H. Gruber. Information Resource Management. John Wiley and Sons. New York, New York, 1981.
- Synott, William R. The Information Weapon: Winning Customers and Markets with Technology. John Wiley and Sons. New York, New York, 1987.
- Tricker, R.I. and Richard J. Boland. Management Information and Control Svstems. John Wiley and Sons. New York, New York, 1982.
- Volunteers in Technical Assistance (VITA). PASCAT: Low Cost Satellite Communications for Development. Washington, D.C., January 1987.
- Wargo, Mark C. MIS Manager's Handbook: Innovative Strategies for Successful Management. TAB Books, Inc. Blue Ridge Summit, Pennsylvania, 1987.

ARTICLES

- Arnold and Keller. "The Rise of the Information Weapon". Infosvstems. June 1987.
- Arteberry, A.C. "GSA Automates Its Decision-Making Process". Government Data Svstems. August 1987.
- Chorafas, Dimitris. "Is the Competition Ahead! Then Leapfrog Them". Computerworld. July 20, 1987.

- Cleveland, Harlan. "Information as a Resource". The Futurist.
December 1982.
- Fisher, M.J. "Market Revving Up for Optical Storage". MIS Weekly.
June 29, 1987.
- Gordon, M.D. "Deficiencies of Scientific Information Access and Output
in Less Developed Countries". Journal of the American Society of
Information Science. November 1979.
- Kotok A. "Information, Please". Foreign Service Journal. March 1987.
- Schwartz, A.P. "No One Way to Cost-Justify Automation: Work Value
Analysis Urged". Government Computer News. October 10, 1986.
- Slamecka, V. "Information Processing and Information Systems".
Encyclopedia Britannica. To appear in 1988 Edition.
- Spero, Joan Edelman. "Information: The Policy Void". Foreign Policy.
Autumn 1982.
- Spishak, Paul. "Program Decisions in AID: Using Automation for
Management". Foreign Service Journal. March 1987.

PERIODICALS

Computerworld
Datamation
Fortune
Government Computer News
Harvard Business Review
Infosystems
MIS Quarterly and Weekly