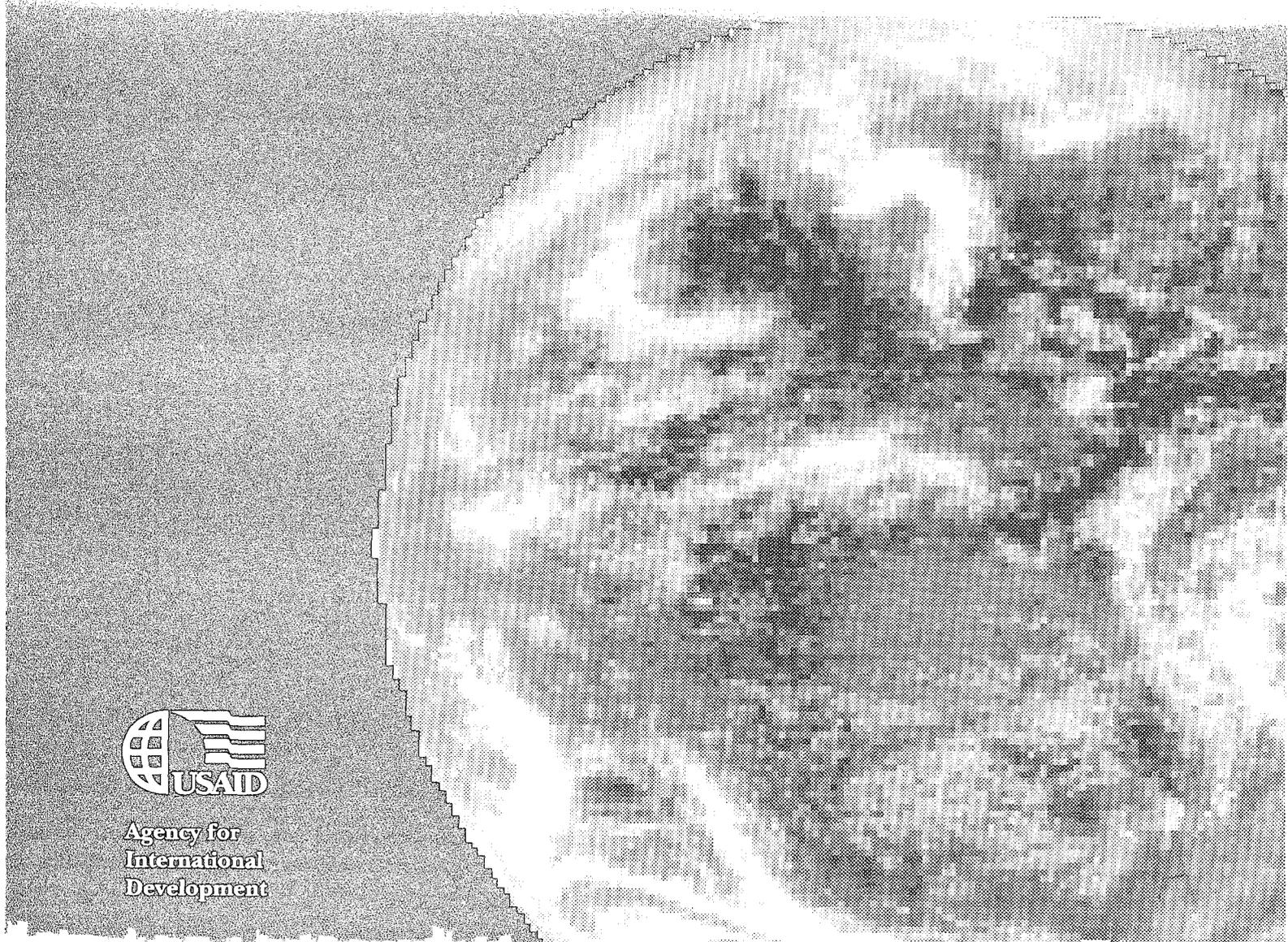


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Agency for
International
Development

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Information Systems Plan
Volume I:
Report to Management

February, 1993

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*ISP Report to
Management
Executive
Summary*

■ Introduction

For most of 1992, the Agency has been engaged in a comprehensive study of its use of information management and technology, known as the Information Systems Plan, or ISP. This study, led by the Office of Information Resources Management (FA/IRM), has involved over 100 managers and senior staff across the Agency in examining A.I.D.'s basic business functions, and how information is used to support those functions. This report summarizes the findings of the study, and outlines a comprehensive plan to remedy the problems that have been identified.

The study comes at a time when the Agency is under severe pressures in regard to its budget, its management practices, and even its basic mission, which is being reexamined now that the Cold War has ended. Critical reports from the Presidential Commission, the Office of Management and Budget, the Inspector General and the General Accounting Office have all alluded to deficiencies in the Agency's information management practices and systems. In addition, many of the other management problems identified will require improved information systems as part of the corrective action, even where these external critics did not specifically identify this.

The study was conducted using a new methodology which has gained wide support in the private sector and is experiencing growing acceptance among government agencies. This approach, known as Information Engineering (IE), stresses three key principles:

- Extensive involvement of users in defining the organization's needs and designing solutions to those needs;
- Shifting the focus of information management from technology *per se* to the business impact of using technology effectively; and,
- The concept of corporate data, using common structures, definitions and standards for data shared across systems and organizations.

■ Summary of Findings

A.I.D. has not done a good job of managing its information resources. This may be attributable partly to the fact that A.I.D. is not a typical government data mill like the Social Security Administration or the Internal Revenue Service. A.I.D. has the traditional array of finance and administrative systems, and like many agencies, these systems are primarily antiquated mainframe systems that no longer serve the Agency well.

However, unlike these other agencies, A.I.D. has not developed extensive systems to support its primary business, the work of planning and managing development projects. What systems exist evolved without a master plan, and consequently are duplicative and not integrated. The reasons include dated technology, an over-emphasis on maintenance at the expense of new development, and a culture that permits individuals and offices to develop systems without regard to standards, sharing data, or cost-effectiveness for the Agency as a whole.

Looking at the Agency's systems, the study found that:

- The Agency has tremendous redundancy in corporate systems, both in Washington and across the Missions. One reason for the redundancy is that because A.I.D. Washington uses an IBM Mainframe and Missions use Wang minicomputers, most applications must be developed twice, even though the business function (inventory, accounting, etc.) is mostly the same in Washington and overseas.
- Most of A.I.D.'s systems have been developed to meet the needs of a particular organization at a particular time and location, without regard to standards or any overall architecture. Developed in this manner, A.I.D.'s systems have no hope of being effectively integrated.
- The Agency's basic business functions vary little across overseas Missions or Washington, although the way they are performed does vary. These variances have contributed to a proliferation of non-integrated and duplicative systems, many for only one or two users.
- There is little information sharing in A.I.D. This is a function of the way in which systems have been designed, the geographical dispersion of A.I.D.'s sites, and system managers' perception that they "own" the data.
- Data sharing is frequently accomplished by rekeying, with a resulting high error rate and tendency toward forced reconciliations, not to mention inefficient use of scarce human resources. A recent GAO report found a 26 per cent error rate in the rekeying of disbursement data.
- Inaccessibility of Mission data in A.I.D./W has led to the creation of redundant reporting requirements, including ad hoc requests for data as well as a variety of standard recurring reports.
- Conflicting data definitions and redundant data collection and keying are endemic throughout A.I.D. The rekeying of data for reporting to higher management levels leads to errors, misrepresentations, etc.
- In perspective, the volume of the Agency's data is small in comparison to transaction-oriented businesses such as the airlines, the Social Security Administration or the IRS.
- The Agency's automated systems have tended to concentrate on numeric or structured data, as opposed to textual "data", which is critical to an agency that relies as heavily on ideas as it does on numbers.
- Program or sectoral data (e.g., data about the sectors in which A.I.D. works: environment, agriculture, health, population, etc.) tend to be collected and managed by individual organizations, and are not readily available to other potential users in an automated fashion.
- Many A.I.D. procedures are still based on manual forms, and should be reengineered before they are automated. Many Agency users lack experience and knowledge in the capabilities of modern automated systems; thus they may define system requirements in terms that "sub-optimize" the efficiencies that could be gained with a well-designed system.
- Many A.I.D. systems require that users complete extensive training. Others waste users' time by not promptly rejecting errors — requiring the user to reassemble source documents the next day to correct errors found in last night's batch verification job. Each system operates differently from all the others, in terms of command structure, appearance of menus, etc. so that each system requires relearning "how to use the computer".
- PC-based spreadsheets, word processors and data bases keep a large portion of the Agency's

E

data, especially in the Operations Directorate and overseas. For the most part, corporate data that are used by these systems are keyed again, rather than loaded electronically. A corollary of this dependence on PCs is that the vast majority of automated systems are used only by a handful of Agency employees.

A review of current technology also found that:

- As of October, 1992, only 35 of 112 overseas locations have reliable desktop-to-desktop telecommunications with A.I.D./W. (The labor-intensive Department of State telegram system does not readily support E-Mail, data transfers, etc.) Technically, telecommunications links can be established with virtually all A.I.D. sites, but costs and national security restrictions may be prohibitive in some sites.
- Many of A.I.D.'s computers are saturated with demand and near collapse from old age. The IBM 3083 mainframe in Washington is two generations behind current technology and usage may have to be rationed soon due to capacity limitations.
- Although the Agency has a mainframe computer, it has not used this platform to perform integrated computing. Most systems on the mainframe operate independently.
- The Agency uses proprietary architecture (Wang) minicomputers in about 40 of its larger Missions and several of its larger A.I.D./Washington offices. A.I.D. has failed to benefit from multi-vendor competition and paid inflated prices for technically mediocre equipment. In fact, the annual costs of maintaining this equipment are almost as high as the costs of simply replacing it with comparably powerful open systems (UNIX) based servers.
- After several years of effort, installation of modern, standard desktop workstations, and the networks to connect them has been accomplished in about two thirds of the Agency's A.I.D./Washington offices, and about half of the overseas Mission population.

The ISP study also looked at the Agency's organization, authorities and policies for information resources management, and found that:

- The Agency's IRM organization (FA/IRM) has not established central authority for information management/information technology (IM/IT) in the Agency, as required by the Paperwork Reduction Act. A recent GAO report pointed to a lack of delegated authorities, and the inability of "the IRM director [to] mandate agencywide use of IRM-sponsored systems." In response to this and other criticisms, an effort to completely rewrite the Agency's IRM policies and procedures is underway.
- Historically, FA/IRM has been in a maintenance mode, and lacks an Agency business orientation. FA/IRM is now in transition, with the ISP study being the first major step toward reorienting both the organization and the Agency's systems to support more effectively the Agency's business functions.
- FA/IRM's historical focus on administrative systems has fostered a perception that it has only a minor role or responsibility for program (vs. administrative) systems — to the Agency's detriment. This has encouraged the development of stove-pipe systems that meet the needs of only individual program offices and which do not talk to one another.
- The lack of a coordinated data administration program has resulted in a "Babel" of information, with multiple conflicting estimates for most data. FA/IRM has developed data administration policies, but has not yet promulgated them Agency-wide.
- Despite A.I.D.'s traditional reliance on field delivery of A.I.D. assistance, the Agency is witnessing the growth of A.I.D./Washington-based programs. The shift of staff from the field to Washington due to budget pressures favors creation of these programs, and of new reporting requirements for the field. Field offices are overwhelmed by the reporting burden imposed by A.I.D./Washington, both because of the workload it imposes, and the perception it gives of second guessing.
- Despite periodic shifts, the general consensus and trend in the Agency is toward increased delegation to the field. Recent management reviews have resulted in a restatement of the

commitment to a strong field presence, and, importantly, the recognition of the need for information systems to monitor performance and support accountability.

- The Agency has perpetually underfunded the capital development component of corporate systems, perhaps overfunding maintenance. The Agency has not focussed on information management/information technology spending in a unified structure. The current pattern of allocating financial resources for IM/IT facilitates:
 - ad hoc stovepipe systems and non-standard data;
 - perpetuation of old, dysfunctional corporate systems due to lack of centralized resources to replace them;
 - disincentives to improve the situation (e.g., A.I.D./W funds Missions' Wang maintenance, but the Missions are expected to fund replacement hardware — which yields savings to A.I.D./W, not to the Missions required to make the investment).
- Agency business and information managers are largely unable to conceive of how effective information management could transform the Agency into a more efficient and better managed operation. However, there is a significant minority who do share this understanding.

■ Proposed Solutions

The ISP team conducted joint strategic planning sessions in order to define, with the help of extensive participation by senior Agency managers, A.I.D.'s business functions and information needs. A detailed functional breakdown of all of the Agency's work was developed, and from this, a data model and set of candidate system definitions were developed. This analysis was extensively verified with A.I.D./Washington and field staff and independently validated and verified by outside experts in the field of Information Engineering.

The ISP report outlines new approaches in the areas of information management, systems, and technology, and also in organizational practices. Solving A.I.D.'s information management problems is not just a technical issue; it will also require such cultural shifts as:

- A reduction in autonomy for many offices;
- The institutionalization of a priority setting mechanism for all Agency IRM spending;
- Reengineering of many basic A.I.D. processes;
- Understanding and acceptance of the concept of corporate (i.e., shared) data;
- Increased coordination and understanding between FA/IRM and program staff of each other's needs and objectives.

Taken together, the solutions proposed in the various sections of the report constitute a future "vision" for information management systems in A.I.D. This vision is summarized in the following principles:

- All Agency employees will have access to the information necessary to do their work at their desktop workstation (to the extent technically feasible), including both numeric and text (documents) data. "Access" includes friendly tools for ad-hoc queries, rather than relying on predefined report programs.
- Senior managers will systematically be provided with up-to-date summary information in an easy to digest form for monitoring, decision making and external reporting.
- All Agency personnel will be served by reliable and secure communications links between A.I.D./Washington and Missions, and among Missions, for both voice and data.
- To the extent feasible and appropriate in light of security and privacy concerns, interchange of data between A.I.D. and its contractors, other donors, other USG agencies, other outside groups, and the general public will be in electronic form.
- The design of a new suite of integrated corporate systems for the Agency will include the following features:
 - The business transactions of the Agency will take place electronically, with data entered only once, at the point of origin. Electronic approvals of transactions will be provided in most systems. Information essential for records management and audit purposes will be captured and preserved automatically.
 - All Agency-developed corporate systems will conform to a standard "look and feel" in terms

of screen layout, use of function keys, etc. This use of a "Common User Interface (CUI)" will reduce training requirements and make it easy for staff to adapt to new automated systems.

- Similar functions will be performed on the same standardized software, regardless of organization or location. Systems will be designed to provide an appropriate degree of flexibility, instead of building duplicative systems to satisfy the particular desires of individual users.
- Standard data definitions and data structures will be developed and enforced across all systems and organizations, in order to facilitate sharing of data.
- Training and documentation will be designed to maximize every employee's awareness of all available information that can help them do their job. Training, documentation, and support will be provided at a level sufficient to ensure that all employees can do their jobs comfortably using automated tools.
- The Agency will have an effective global planning process which encompasses all IRM functions, and which supports the Agency Business Plan.
- The Agency's information architecture will accommodate the rapid strategic and tactical changes of the Agency, in response to the pursuit of U.S. interests and A.I.D. goals.
- The Agency's IRM program will meet all Federal legislative and regulatory requirements.

■ The ISP Action Plan

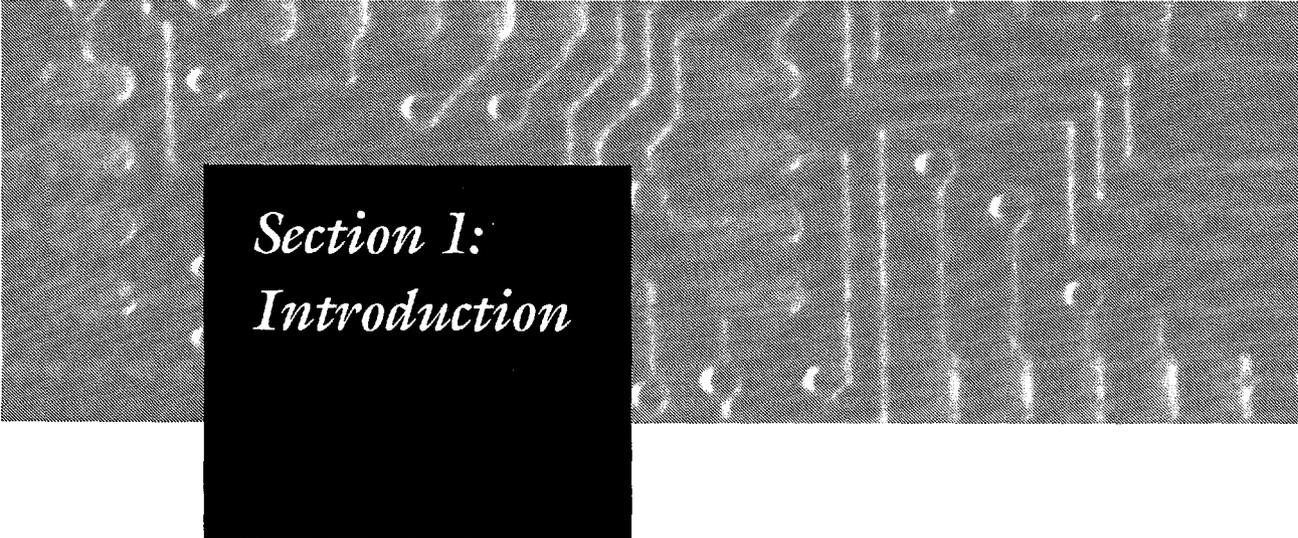
The effort to implement this vision represents an enormous task for A.I.D. — essentially the replacement of its entire information systems inventory, and the upgrading of much of the hardware on which those systems run. In the aggregate, this is expected to be the largest information systems project the Agency has ever undertaken, and, when fully implemented, will affect the daily working lives of over 8,000 A.I.D. employees. Even assuming no resource constraints, the problems of scheduling and managing such a project are formidable. Given the Agency's tight budgets, the challenge is

even greater, but it is precisely for this reason that the Agency must address its plethora of inconsistent and nonintegrated systems. The costs of doing nothing include a continued expenditure of some \$50 million annually for information technology and systems, and the uncalculated costs of the inefficient management practices (e.g., rekeying data, preparing unnecessary reports) that these systems foster.

The last section of the ISP report, beginning on page 25, outlines a five-year plan to develop and implement the new systems called for in the ISP. The costs for this plan, which include hardware, software, telecommunication links, and installation and training, are significant, totalling \$46 million in capital investment over five years. In addition, a number of ongoing, related efforts, such as the AWACS project to replace the core accounting system, and the installation of PCs and LANs in all Missions and Offices represent costs outside the ISP budget, but essential to its completion. The projected costs, while substantial, must be seen in perspective. The Agency will spend over \$250 million over these same five years if it just continues business as usual. *The investment called for here should significantly impact this ongoing spending, and a cost/benefit analysis to examine this is one of the first tasks called for in the Plan.*

A number of strategies were devised to implement the vision described above. These include:

- a move to an open systems/client server hardware architecture that will permit the Agency to run the same software at Missions and offices of all sizes at significantly lower costs than the Agency's current hardware platforms;
- a world-wide telecommunications network that permits the daily uploading and downloading of data that Missions need to do their work efficiently, and that Washington needs to exercise its oversight responsibilities;
- a modern relational data base management system as the basis for all applications, permitting easy access to data by users and facilitating rapid application development; and
- a suite of integrated software applications that will support all of the Agency's business functions with single point of entry for data, sharing of data between systems, and a common

A graphic featuring a dark, textured background with a central black rectangle containing the text "Section 1: Introduction" in a white, serif font.

Section 1: Introduction

■ Charter

In the first quarter of FY 92, the U.S. Agency for International Development (A.I.D.) began an effort to define its information needs, and the systems and architecture needed to meet those needs. This study is known as the Strategic Information Systems Plan (SISP):

- **Strategic:** looks at the Agency's overall business and information environment, with a view toward future as well as current needs;
- **Information:** centers on analyzing the information requirements of the Agency;
- **Systems:** develops frameworks for how data, information systems, and technology can be linked to meet user needs;
- **Plan:** produces a strategic plan with resource requirements and an implementation schedule.

The SISP, or ISP as it is more commonly called, had two objectives:

- To establish a strategy for using information to more effectively support the Agency's business; and,
- To increase the involvement of Agency program managers in the definition and development of opportunities to use information to conduct the Agency's business.

The study was sponsored by the Information Management Committee (IMC), which oversees all information management activities in the Agency at the Directorate level.

■ Scope

The scope of the study included both Washington and Mission information needs, both operating expense (OE) and program-funded systems, both data and text, and all corporate systems. The concepts of corporate systems and corporate data are key elements in the approach:

Corporate data are data that need to be shared among two or more organizational entities (e.g., Directorates, Bureaus, Offices) in the Agency. Corporate systems include any system that is used by or of benefit to more than one organizational entity to create, update, or delete corporate data.

Thus, non-corporate systems are those used only by or within one organizational entity, but even these will generally use data downloaded from a corporate system.

■ Methodology

The study used an industry accepted approach known as Information Engineering (IE). This methodology calls for studying the entire organization's information needs and carefully defining a number of "environments": the information, systems, technology, and organization environments. Each of these is a necessary element in understanding the needs of the organization, and ultimately in devising the total plan (or "architecture") for meeting these needs. The IE methodology has been used to provide significant improvements in many private sector organizations, and increasingly is being adopted by government agencies wrestling with productivity and budget issues. Both private and public sector are finding the approach an effective tool for dealing with the common problem of "doing more with less".

There are three distinguishing characteristics of this methodology: extensive involvement of users in defining the organization's needs, a focus on business impact, and the concept of corporate data.

- **User Involvement.** Although the study was led by the Office of Information Resources Management (FA/IRM), it involved over 100 mid-level and senior managers from across the Agency. A group of 16 senior managers, drawn from all three directorates and several independent offices in the Agency, constituted the ISP Steering Committee (see Appendix I), which acted as a sounding board for the study group at key junctures throughout the project. In addition, numerous interviews were conducted both in A.I.D./Washington and in selected Missions.
- **Business Impact.** IE attempts to shift the focus of information management from technology *per se* to the business impact of using technology effectively. Thus, systems are engineered

around basic business functions, and may cut across traditional organizational boundaries in order to increase the efficiency of the overall organization.

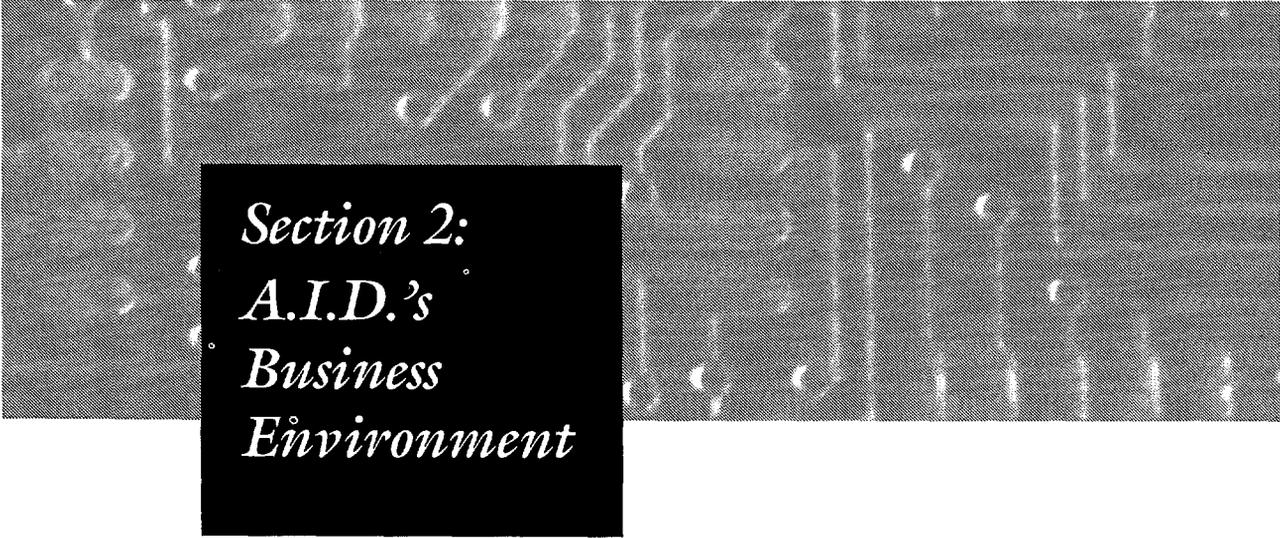
- **Corporate Data.** The concept of corporate data focuses on data used by more than one organizational entity, and on the need for using common data structures, definitions and standards across systems and organizations.

The ISP should be viewed as a "living document". This report, representing the results of the foundation study, provides a roadmap to change. However, it will be refined and updated on at least an annual basis. The business function, data and process models will be adjusted as the Agency completes the next phase of analysis, and as the Agency responds to changes in A.I.D.'s mission, objectives, strategies, organization, and information requirements.

■ Organization of the ISP

This report to management constitutes Volume I of the ISP Report. Volume II, available upon request, contains the detailed analyses and work papers. Appendix 2 to this volume lists the contents of Volume II.

The remaining sections of Volume I look first at A.I.D.'s business environment, and then examine each of the four environments listed above in turn. For each, the environment is first defined, followed by a description of the current situation, a set of requirements, and concluding with proposed solutions. The last section presents an action plan for implementing the recommendations of the study.



*Section 2:
A.I.D.'s
Business
Environment*

■ Agency Mission

The mission of A.I.D. is to administer economic assistance programs that assist developing countries to realize their full national potential through the development of open and democratic societies and the dynamism of free markets and individual initiative. Traditionally, this has been accomplished largely through A.I.D. development specialists planning and implementing projects in client countries. Over the years, A.I.D. has established field Missions in nearly every country it serves (presently 94). These Missions design and implement programs that range from immunizing small children against polio in Asia to helping subsistence farmers in Africa grow more food to supplying shelter and medicine to hurricane victims in the Caribbean.

■ Current Situation

Today, A.I.D. faces a great deal of uncertainty regarding its mission. The end of the Cold War and the changing world scene have caused both the Administration and the Congress to question A.I.D.'s traditional approach and methods of delivering assistance, as the very role of foreign assistance itself is reexamined. The current legislative authorization, with 39 different objectives and a pattern of detailed earmarking of funds for both projects and countries, is widely recognized

as needing reform. While no clear answers are expected to emerge for some time, the Agency is committed to moving forward on a host of management improvement efforts, knowing full well that the prospect of radical structural changes could significantly affect these efforts. For example, a decision to significantly reduce A.I.D.'s presence in the field, and administer more programs centrally, would have a major impact on the Agency's management procedures and systems. Similarly, the possibility of major organizational changes in A.I.D./Washington could affect the Agency's information requirements. The ISP, like other ongoing management improvement efforts in the Agency, is based on the assumption that the Agency will continue its current delivery modes and basic organizational structure.

Budget pressures, which afflict all agencies today, are a particular problem at A.I.D. The Agency requested additional funds for FY 94 to implement its many improvement efforts, but the overall trend is down for operating expenses and staff levels. Despite wide recognition within A.I.D., the Administration, and the Congress that significant improvements are needed, securing money to make the needed changes is problematic.

One impact of the Agency's funding problems has been the trend to shift staff from the field back to Washington, despite the Agency's commitment to having staff in the field to design and implement its programs. Since the cost of maintaining one direct-hire staff person in the field is

about 1.6 times greater than in Washington, over the past six years the Agency has seen a 19 per cent decline in field staff levels, while at the same time Washington staff has declined only 2 per cent. This has given rise to an increasing number of projects managed out of Washington, and also to a growing demand for information on field activities by Washington staff — trends that impact the Agency's information systems.

■ External Assessments

A.I.D.'s management improvement efforts are spurred, in part, by a series of high profile reviews of Agency operations by a Presidential Commission, a joint A.I.D./Office of Management and Budget (OMB) SWAT Team, and a General Management Review by the General Accounting Office (GAO). As is often the case with outside reviews, these reports have increased the focus on problems that the Agency has recognized and been wrestling with for some time. While each of these reports has a somewhat different focus, each of them contains many recommendations which need not wait on the resolution of the larger question of the role of foreign aid in the Nineties.

To address these recommendations, the Administrator approved an Action Plan on August 31, 1992. The plan focuses specifically on the 30 recommendations of the A.I.D./OMB SWAT Team. However, under the broader umbrella of A.I.D.'s "Management Improvement Plan (MIP), Phase II", these and other study recommendations will be addressed. The MIP has five key focal points:

- **Human Resources:** Improving personnel appraisals, training, and accountability;
- **Portfolio Management:** Defining the responsibilities, and the information needs, for activity monitoring at each major management level within a decentralized agency;
- **Contracting:** Increasing training, revising delegations, and expanding evaluations of the contracting function to improve both accountability and performance;

- **Financial Audits:** Increasing responsibility for audits on contractors and grantees, as well as host governments;
- **Program Evaluation:** Improving A.I.D.'s capability to measure and assess program and project performance.

The Agency's ISP is intended to support these initiatives and other improvement efforts by reengineering and integrating the information systems that Agency management needs to accomplish these ends. Exhibit 1 lists some of the systems issues identified in the various reviews of the Agency. In fact, nearly all of the management issues raised have some implications for automated systems.

■ Impact of Information Management

Given this environment, it is important to assess what impact information management and technology have, and could have, on the Agency's operations. A.I.D. is not a traditional government "data mill", like the Internal Revenue Service or Social Security Administration, but rather a project management organization. A.I.D.'s corporate systems have been concentrated in the areas of finance and administration — the traditional "housekeeping" functions that are fairly standard across government, and very suitable to automation. However, increasingly sophisticated tools are becoming available that do address A.I.D.'s core business, such as project management software, and better tools for handling text. These new tools increasingly offer solutions for A.I.D.'s business needs, particularly if they can be effectively integrated with financial and other support systems.

Information management and information technology (IM/IT) are not the answer to all of A.I.D.'s problems, but as shown in Exhibit 1, they can contribute to the solution of many, if not most. Specific ways in which IM/IT can have a strategic impact include the following:

- **Reducing the numbers of A.I.D./W staff providing oversight.** A significant amount of effort is devoted by Missions to transmitting informa-

Exhibit 1: A.I.D. Management Reviews: Systems Implications

Source/Issue Identified	Systems Implications
<i>Presidential Commission:</i> Agency must adopt a uniform program and project management system, and continue to emphasize results-oriented evaluations.	Automated systems to facilitate planning and tracking of results will be required, with links to Budget and Accounting systems.
A.I.D. should adopt computerized systems to support workforce planning.	Software must be developed which links several different payroll/personnel systems so that the Agency can look at the combined workforce as a whole.
A.I.D. needs to develop a comprehensive Agency-wide plan to guide its financial management systems development and operations.	Drawing on the results of the ISP, the Agency submitted its Five Year Financial Systems Plan to OMB in August, 1992, which integrated the existing Agency-Wide Accounting and Control System (AWACS) project plan with plans for other, related systems.
Implement the Contract Information Management System (CIMS) worldwide.	For the near term, Missions will either use telecommunications to report data to the central CIMS system; for the longer term, a redesigned and integrated contract management system must be developed.
<i>A.I.D./OMB SWAT Team Report and Action Plan:</i> A.I.D. does not have the information systems necessary to support field activity monitoring and oversight. Duplicative, non-integrated systems lead to inconsistent, inaccurate and incomplete reporting.	A.I.D. must review existing and proposed systems improvement projects with the goal of consolidating and improving them so that Washington management will obtain reliable information.
The Agency needs to increase accountability through tightened performance standards and appraisals.	Information systems are needed to support closer integration of information on workforce availability, work assignments, and performance appraisal.
A.I.D. has not defined and does not collect the information necessary for oversight of field activity.	Both short-term and longer term reporting systems must be implemented to meet management's needs.
<i>GAO Testimony on A.I.D. Management Problems:</i> A.I.D.'s many non-integrated financial systems require rekeying of data, causing errors.	A.I.D.'s system architecture must provide for data to be entered only one time at the point of origin, and for the direct sharing of data among systems.
A.I.D. does not have the controls in place to ensure implementation of the IRM plan's initiatives.	New management procedures and policies must be put in place to ensure the success of the ISP.
There is no office with central responsibility or control over the flow or availability of A.I.D. data.	A.I.D. must implement data administration standards, including establishment of a data administration committee to resolve problems.
A.I.D. does not ensure priority for the IRM plan initiatives in the Agency budget process.	The ISP will require significant funding commitments, which must be addressed as part of A.I.D.'s overall management improvement efforts.

tion to Washington in hardcopy form. Many staff in A.I.D./Washington spend considerable time analyzing and repackaging the information for onward transmission to other Washington staff. To the extent that this information flow can be automated, staff years now devoted to this function can be shifted to more critical areas, such as program delivery. The private sector has shown the value of aggressively using improved information flows to reduce the requirements for mid-level staff performing this function.

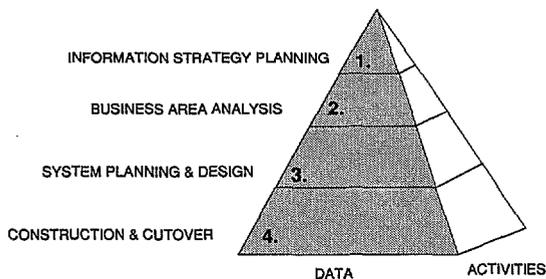
- **Improving field project management capabilities.** The need for timely information is even more critical for the manager in the field than for senior management back in Washington. An expanded telecommunications and program management software network will increase the field manager's ability to communicate with other organizations involved in the project, draw on external data useful to the project, and monitor the progress and funding of the project.
- **Facilitating program, project and personal evaluations, and promoting accountability.** There are four key elements to accountability — setting standards, defining measures, collecting data on performance, and assessing the results. Information systems are key to the second and third items, and can assist in the other two. Measuring effectiveness must be done both in terms of internal criteria (e.g., meeting milestones, managing the pipeline) and external criteria (e.g., did the project have a measurable impact on the country's health). Better systems are needed to address both these criteria.
- **Improving project design by facilitating the sharing of A.I.D.'s institutional memory.** While A.I.D. maintains a data base and library of papers on "lessons learned", access to this data has been limited by technology, and the completeness of the library limited by incomplete submission of documents by offices and Missions, and by budget constraints. New technology can make this information more readily available to project managers throughout the Agency, and can also facilitate the electronic collection and indexing of documents as they are created.
- **Institutionalizing uniform systems and management procedures.** A.I.D.'s management systems suffer both from technical defects and from a lack of standardization throughout the Agency. New systems will address the technical deficiencies, but they must be accompanied by policies mandating their use, or the Agency's problems with duplication of effort and inconsistent data will continue. Well-designed new systems provide both the opportunity and the rationale for standardizing data, systems, and procedures.
- **Direct monetary savings.** Despite the Agency's severe budget pressures, it is spending more than \$50 million per year¹ on its IRM program throughout the Agency, much of it for duplicative and inefficient systems. A well designed and managed information strategy can reduce this sum significantly, freeing scarce resources for more vital program needs. In addition, secondary effects (e.g., reducing the costs of entering data more than once or facilitating better management decisions) may produce savings in other parts of the Agency's operations in addition to IRM program costs.
- **Reducing opportunities for fraud, waste and abuse through tightened financial controls.** The Agency's problems in this area have been well publicized. Improved management systems — core accounting in particular, but not alone — are an essential component of the Agency's efforts to strengthen controls.
- **Expanding the use and effectiveness of delegated authorities.** In his August 1992 newsletter on management reforms, the Administrator reiterated the Agency's commitment to increased delegation of authority to managers in the field, but coupled this with the need to exercise appropriate controls in Washington. To be effective, these delegations must be accompanied by well-defined standards, and the rapid flow of information back to senior managers in A.I.D./Washington on how those standards are being met.

¹ Based on the annual survey compiled to prepare the "43A" report to OMB. This includes hardware, software, and telecommunications used by Washington and the Missions funded by Operating Expense monies, and some Program-funded systems operated and maintained by A. I. D. Washington, but *excludes* IRM components of A.I.D.-financed development projects.

Section 3: Information Environment

■ Definition

The Information Engineering methodology encourages first looking at how information is used in an organization without regard to current system or organizational boundaries. While it is admittedly somewhat difficult to talk about information without talking about systems, the advantage is that it encourages a fresh look at problems and issues. The approach used in the ISP was to interview managers and staff throughout the Agency to determine what work the Agency must do, and what information is needed to perform this work. The analysis and synthesis of this information led to the development of computerized models of Agency business functions and data (discussed below under "Solutions"), which were extensively validated with users and industry experts. Volume II presents a much more comprehensive discussion of both the methodology and the analytical results.



■ Current Situation

The following summarizes some of the key findings of the study. Many of these have been recognized by other internal analyses and external studies of A.I.D.:

- In perspective, the volume of the Agency's data is small in comparison to transaction-oriented businesses such as the airlines, the Social Security Administration or the IRS.
- The Agency's basic business functions (e.g., accounting, inventory) vary little across overseas Missions or Washington, although the way they are performed does vary. These variances have contributed to a proliferation of non-integrated and duplicative systems, many for only one or two users.
- There is little information sharing in A.I.D. This is a function of the way in which systems have been designed, the geographical dispersion of A.I.D. Missions, and managers' perception that they "own" the data, and can or should sometimes limit who has access to it.
- Inaccessibility of Mission data in A.I.D./W has led to the creation of redundant reporting requirements, including *ad hoc* requests for data as well as a variety of standard recurring reports.

- Conflicting data definitions and redundant data collection and keying are endemic throughout A.I.D. The rekeying of data for reporting to higher management levels leads to errors, misrepresentations, etc. The same data element is duplicated in the personnel system, the accounting system, and the procurement system, with redundant storage and often incompatible data definitions and validity checks. As a result, A.I.D. gives inconsistent answers to such questions as “How many people work for A.I.D.?” or “How many Missions does A.I.D. have?”
- The Agency’s automated systems have tended to concentrate on numeric or structured data, as opposed to textual “data”. Since, in many respects, A.I.D. is an idea factory, rather than a data factory, this focus on structured data has not served the Agency’s program staff well.
- Program/non-administrative data (e.g., data about the sectors in which A.I.D. works: environment, agriculture, health, population, etc.) tends to be collected and managed by individual organizations, and is not readily available to other potential users in an automated fashion.
- Users express a strong need to integrate data, especially for project/activity management, procurement, and accounting. Systems developed in these areas must use not only the same data definitions, but the same data wherever possible, to prevent the effort and errors associated with rekeying data, and the inconsistencies that arise when redundant records are kept.
- Data costs a lot to gather, verify, and enter, and therefore should be treated as a corporate resource. This means that individuals or offices may be held responsible for creation or validation of the data, but they are not empowered to decide who or what other systems will share this data, nor to redefine the data without coordination with others.
- Textual data is a significant part of A.I.D.’s business, and systems must support its use and distribution just as we do structured data. This includes capturing text in electronic form for archiving and sharing, indexing it so that it can be located, and providing mechanisms to deliver it wherever it is needed.
- Non-administrative data (e.g., data about A.I.D.’s program sectors) is a significant element in managing A.I.D. programs, and systems need to manage and support distribution of this data.

■ Information Needs

Based on the interviews with users, the following general needs have been defined for the Agency’s information architecture:

- Individual offices, both in Washington and the Missions, need both detail and summary information on their operations. In addition, Washington needs timely summary level information on Mission activities. (The level of detail needed by Washington must be decided in the systems development process.)
- Automation should support standardization of business processes across Missions, Bureaus, and Offices. Most of the business functions done in Washington are also done in the Missions. Where the functions are the same, the information and software used should be the same.

■ Proposed Solution

The proposed “solution” to the information environment is not a list of systems or hardware, or policies, as will be found in the Proposed Solutions sections that follow. Rather, it is an analytical structure which will inform future efforts to develop the Agency’s information architecture. The IE methodology specifies this “modeling” approach in order to ensure that a comprehensive, valid understanding of the organization’s business is the foundation for all subsequent analysis. The analytical structure consists of two major elements:

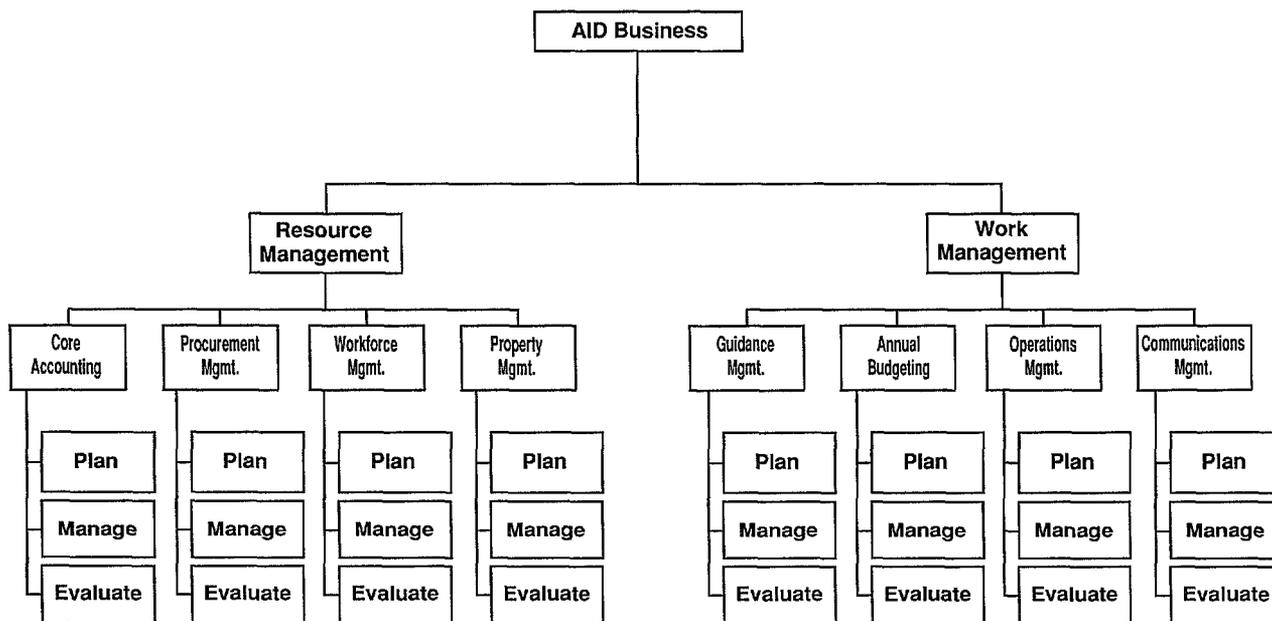
A. Business Function Model

The business function model is an attempt to capture and categorize in a work-breakdown structure all of the Agency's work. The detailed breakdown, contained in Volume II of the ISP, takes each of the eight functions shown in Exhibit 2, and further decomposes them to show all of the individual tasks which the Agency must perform. At the summary level shown below, all of A.I.D.'s business can be divided into two major categories, *Work Management and Resource Management*. These are further divided into the eight functions, and each of these can be viewed as consisting of planning, management/implementation and evaluation phases. Most of the eight functions are relatively self-explanatory. "Operations Management" refers to actual project planning and management activities, as well as the information needed to plan projects (e.g., health data) and to evaluate them. "Guidance Management" refers to the process of developing

and distributing instructions to subordinate offices. "Communications" addresses the primarily Washington-based functions of handling external communications with interest groups, Congress, and the general public.

This model was developed initially in Joint Strategic Planning sessions with A.I.D. managers on the ISP Steering Committee, and then was validated in meetings and interviews with Agency staff in both Washington and the Missions. The significance of this model is not that it is an indisputably perfect representation of the Agency — other valid categorizations are possible. Rather, the important factor is that, based on extensive validation, it is complete. Using these models, FA/IRM analysts have developed extensive cross-checking matrices of these functions against organizations, information needs, existing systems, etc. These can be analyzed by specialized analytical software to group functions and processes together based on shared information needs, and to begin to define the data structure for the

Exhibit 2: A.I.D. Business Functions



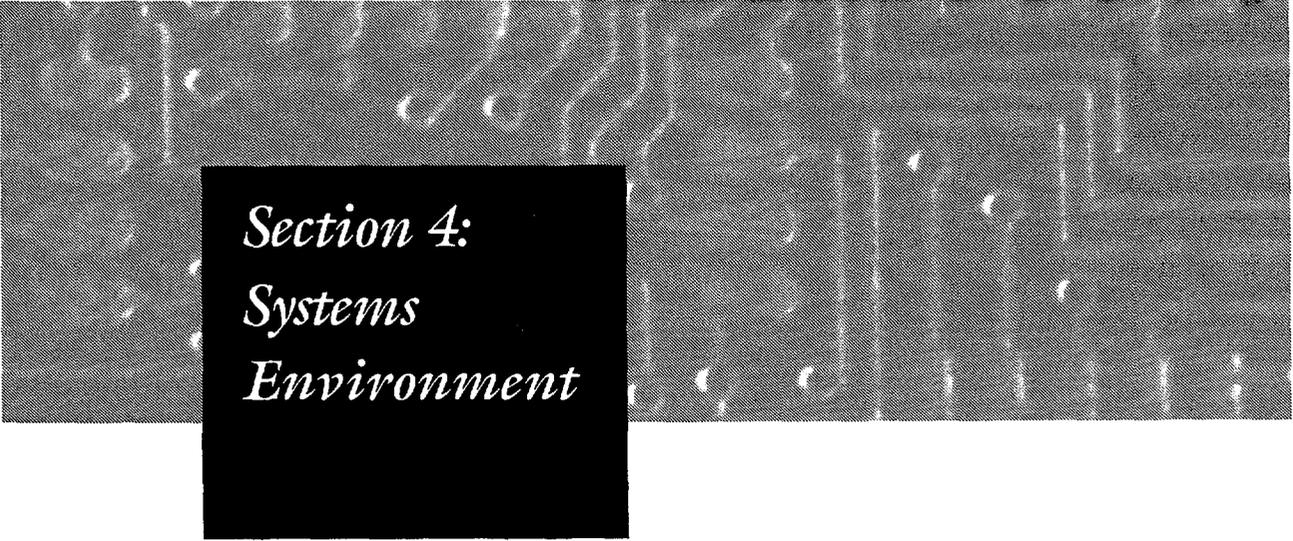
Agency's new generation of integrated corporate information systems.

B. Data Model

Based on the above functional breakdown, approximately 80 data "entities" have been defined. An entity is something about which the organization needs to keep information (e.g., person, invoice, etc.). The value of using an abstract model is that one can begin to see similarities among data elements (i.e., a travel voucher is really just a specialized form of invoice), and thus software modules can be developed and reused in similar situations. Reusability of software modules is one of the key tenets of information engineering, leading to major productivity gains in the systems development process.

An even more critical reason for the data model is that it enables the Agency to share data among systems. A consistent set of data definitions is the basis on which all corporate systems must be built. In addition, the model helps in structuring data to maximize processing efficiency. This also points to the need for a rigorous Data Administration program to ensure that the model is followed, and adapted, as new systems are developed over time. Where conflicts may arise among users and systems developers over definitions, the Data Administration program provides a mechanism for the resolution of those issues.

More details and background information on both the Business Function Model and the Data Model can be found in Volume II of the ISP.

A large graphic with a dark, textured background. In the center, there is a black rectangular box containing the text "Section 4: Systems Environment" in a white, serif font.

*Section 4:
Systems
Environment*

■ Definition

The systems environment refers to A.I.D. applications software, including related data files. Thus, in the systems environment we focus on concrete, specific systems, whereas in the information environment, we focused on the more abstract models. The analysis of business functions and information needs informs the systems architecture, and will lead to a suite of systems with somewhat different boundaries than past systems, due to the integration of what were previously stand-alone systems, and the sharing of data across systems.

■ Current Situation

- A.I.D.'s stovepipe systems have been frequently cited in criticisms of the Agency. As Exhibit III illustrates, the Agency has tremendous redundancy in corporate systems —e.g., nine separate budget systems, not counting the many spreadsheets that most managers use to keep track of their budgets. This redundancy is presumably repeated in non-corporate systems (systems used by only one individual or organizational entity), although no inventory of these systems exists. GAO, in its
- One reason for the redundancy is that because A.I.D. Washington uses an IBM mainframe and Missions use Wang minicomputers, most applications must be developed twice, even though the business function (inventory, accounting, etc.) is mostly the same in Washington and overseas. While Washington and the Missions are duplicating each other's work, neither is doing it very efficiently. Neither Washington nor the Missions has effectively implemented CASE² tools, data administration, relational database management systems, or other modern tools. Most of the code is still produced in COBOL, a relatively antiquated programming language, with either IBM or Wang access methods .
- Most of A.I.D.'s systems have been developed to meet the needs of a particular organization at a particular time and location, without regard to standards or any overall architecture. Developed in this manner, A.I.D.'s systems have no hope of being effectively integrated.
- Many A.I.D. procedures are still based on manual forms, and should be reengineered before they are automated. Many Agency users lack experi-

recent review, found that many systems developed by Missions were undocumented and had serious shortcomings.

² Computer Assisted Software Engineering

ence and knowledge in the capabilities of modern automated systems; thus they may define system requirements in terms that “suboptimize” the efficiencies that could be gained with a well-designed system. Thus, most A.I.D. systems are automated versions of these manual procedures, and do not take full advantage of automation by “reengineering” the processes themselves. A recent article on reengineering referred to this common problem as “paving cowpaths.”

- Data sharing is frequently accomplished by rekeying, with a resulting high error rate and tendency toward forced reconciliations, not to mention inefficient use of scarce human resources. A recent GAO report found a 26 per cent error rate in the rekeying of disbursement data.
- Many A.I.D. systems require that users complete extensive training. Others waste users’ time by not promptly rejecting errors — requiring the user to reassemble source documents the next day to correct errors found in last night’s batch verification job. Each system operates differently from all the others, in terms of command structure, appearance of menus, etc. so that each system requires relearning “how to use the computer”.
- PC-based spreadsheets, word processors and data bases keep a large portion of the Agency’s data, especially in the Operations Directorate and overseas. For the most part, corporate data that is used by these systems is keyed again, rather than loaded electronically. A corollary of this dependence on PCs is that the vast majority of automated systems are used only by a handful of Agency employees.

Exhibit 3 shows that A.I.D. has a large number of automated systems that duplicate each other. This exhibit shows the distribution, by function supported, of a total of 74 systems, primarily those maintained by FA/IRM. Some systems support more than one function, and are counted more than once. This accounts for the total number being considerably higher than 74. While traditional administrative functions such as accounting, budgeting, and logistics are highly automated, others like guidance are still not automated at all.

**Exhibit 3:
Existing Systems by Business Function**

Functional Area	Number of Automated Systems
Core Accounting	35
Workforce Management	15
Procurement Management	16
Property Management	15
Communications Management	11
Guidance Management	0
Annual Budgeting	9
Operations Management	34

■ System Needs

- The next generation of corporate information systems should operate in both headquarters (A.I.D./W) and the field. There is neither the need nor the resources available to build two (or more!) separate sets of systems. Systems will be designed to provide the appropriate degree of flexibility, but the current practice of building duplicative systems to satisfy the particular desires of individual users cannot be supported.
- Systems must provide all Agency employees with access to the information needed to do their work at their desktop PC, including both numeric and text (documents) data. “Access” includes friendly tools for ad-hoc queries, rather than relying on predefined report programs. Access also means that senior managers must be provided with up-to-date summary information in an easy-to-digest form for monitoring, decision making, and external reporting.
- Systems must be easy to learn and to use, particularly in an agency where rotation of assignments is so common. This points to the need for a Common User Interface (CUI) to standardize

the look and feel of all systems. Under a CUI, a given function key will always do the same thing in all systems; the process for entering an item on a data entry screen will work the same way everywhere; a particular color highlighting a field will have the same meaning in all systems. Once a user has learned any A.I.D. application, he/she should know how to navigate around, get help from, or terminate any other A.I.D. application. This approach depends on establishing and enforcing standards, and on making the commitment to establish an integrated suite of applications.

- Systems should automate the business process from the point of origin (as opposed to paper processing with end-stage keying). Thus, a request for a commodity to be purchased should be entered by the original requester, and the essential data will flow through the approval and procurement process without ever being reentered. As a corollary, Agency systems should incorporate electronic signatures for authorization/clearance of most actions, to speed work and reduce paper. Also, information essential for records management and audit purposes will be captured and preserved automatically.
- Systems should be designed to share data in an integrated fashion. This means that, for example, a contract modification would be entered in the contracting system, and other systems would reflect this event automatically, rather than by rekeying the data.
- Business systems should incorporate a tracking feature, so one can find out where the work is if it's not on one's desk. Thus, the initiator of the purchase request alluded to above should have the capability to query the status of that action and determine who currently has the action on that item, and whether it has been approved, ordered, received, etc.
- Agency systems should use Electronic Data Interchange (EDI) to exchange data with contractors and possibly clients to the extent feasible and appropriate in light of security concerns. Invoices, for example, should be provided in a form that can be entered directly into the

accounting system, rather than A.I.D. having to key the data.

- Reliability must be designed into all software applications — A.I.D.'s multiple remote installations mean that maintenance requirements must be held to an absolute minimum. Missions shouldn't be expected to dedicate significant amounts of staff time to keeping standard systems running.
- A.I.D.'s systems architecture must address cost concerns, especially in light of the Agency's fiscal problems:
 - The cost of programming and maintaining duplicative systems can no longer be supported.
 - Methodology and development tools must be imposed to reduce development costs (and lead times).
 - Eliminating the costs of rekeying data, preparing unneeded reports, and inefficient searches for poorly maintained paper records will free staff for more critical work, or to accommodate downsizing, if necessary.

■ Proposed Solutions

The extent of the system needs listed above dictates a radical approach: radical in the sense that virtually all of the existing corporate systems must be replaced with a new suite of applications that can be implemented throughout the Agency. While this is obviously a costly venture, it will be even more costly to do nothing.

The approach to this is based on the Information Engineering methodology. The next phase following the ISP is to do "Business Area Analyses (BAAs)" on each of the eight functional areas defined above. A BAA takes one piece of the ISP and looks at it in far more depth. The functional and data models for this area are fleshed out in more detail, while reference to the corporate models ensures that this area will be consistent

and integrated with other areas as each is completed. The BAAs are followed by Rapid Application Development (RAD) projects, using automated software development techniques to deliver working systems in far less time than using traditional approaches.

The matrix of illustrative systems, grouped by business function, shown in Exhibit 4, illustrates the likely systems architecture to be developed. This list was developed by taking the functions and data needs previously identified and using a computer-generated affinity analysis to group logically related functions and processes into systems categories. These categories are, at this point, rather broadly defined (with the exception of the AWACS systems, because that project is further along in the IE process). The BAAs will begin to clarify the number and boundaries of the actual systems to be developed, and to determine how best to integrate the new architecture with known system plans (e.g., AWACS, PRISM). More detailed analysis in the BAA process may well uncover a need for additional systems/modules, or the potential to condense two or more of these into a single system. For example, the Business Area Analysis for Operations Management will need to determine whether a general Project Management system can be developed/customized to support such specialized program areas as Participant Training or Food for Peace, or whether these will require unique systems, as they currently do.

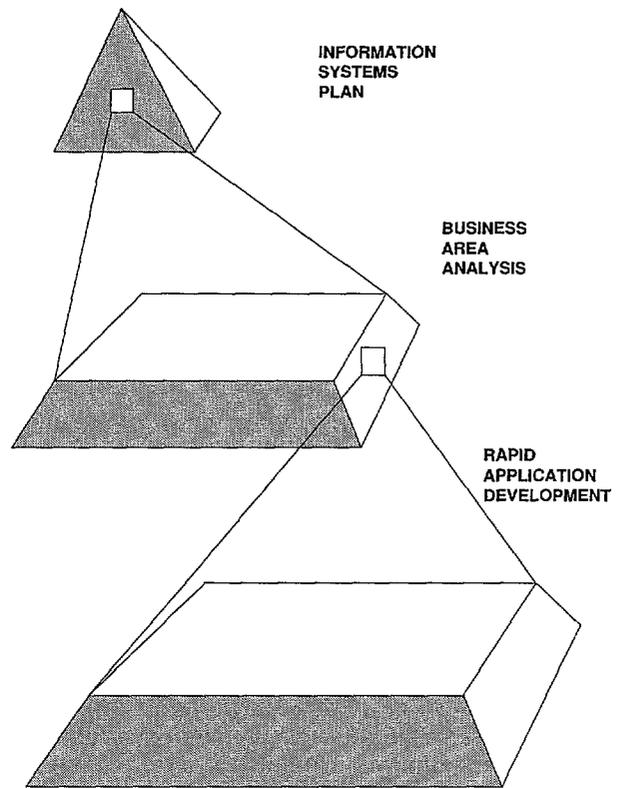
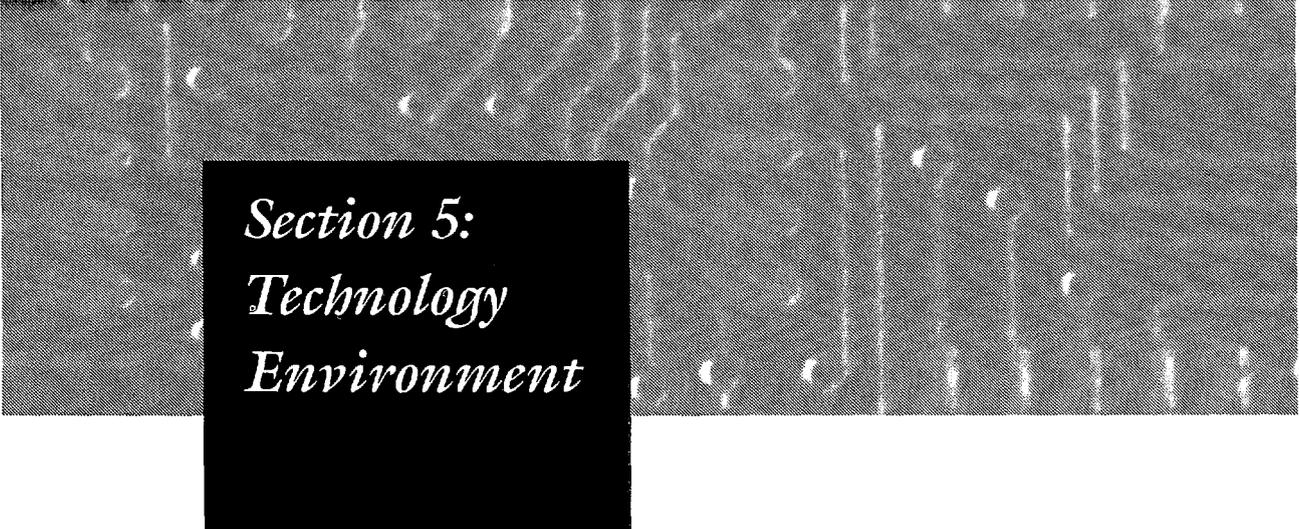


Exhibit 4: Illustrative Systems Architecture

Functional Area	Systems Categories
Core Accounting	AWACS: - General Ledger - Budget Execution/Funds Control - Accounts Payable - Accounts Receivable - Cost Accumulation - Credit Management Mission Accounting
Workforce Management	Workforce Planning Workforce Administration Career Development Payroll
Procurement Management	Procurement Planning Award Procurement Contract/Award Administration Procurement Audit and Evaluation
Property Management	Property Planning and Evaluation Property Usage Management Inventory Management Motor Pool Management
Communications Management	Correspondence Management
Guidance Management	Guidance Formulation and Access
Annual Budgeting	Budget Management
Operations Management	Strategic Activity/Project Planning Activity/Project Implementation Planning Activity/Project Implementation Management Activity/Project Evaluation
(Cross-functional)	Text/Image Management and Retrieval

This set of illustrative system categories, when fully defined in the Business Area Analysis process, will support all of the Agency's information processing needs, as well as provide top

management the information needed for decision support. Section 7 presents an Action Plan for developing the ISP systems.


 A graphic for Section 5: Technology Environment. It features a dark, textured background with a central black rectangle containing the text 'Section 5: Technology Environment' in a white, serif font.

Section 5: Technology Environment

■ Definition

The term "Technology Environment" refers to the hardware, operating systems and other commercial software, and telecommunications required to support A.I.D.'s business applications systems. Technology issues are addressed only after the information and systems environments have been analyzed, so that the appropriate technology can be selected to suit the requirements of the Agency's business systems, rather than the reverse. From the analysis of the information and systems environments, the ISP defined approximate data volumes for the various systems, as well as the relationships among the information types, and the model of who in the organization uses the data. The systems architecture then further defines the distribution of business systems by location to identify where technical resources must be located and how they will communicate with each other, if required. In addition, certain design considerations, such as the requirement to key data only once at the point of origination, and to use the same software in both Washington and the Missions, also influence the choice of technology. All of these and other considerations were used in defining and sizing the technical architecture described in this Section. More detailed background information and analysis can be found in Volume II.

■ Current Situation

Like its systems software, much of the Agency's technology is no longer state of the art and does not fully meet the Agency's information needs.

A. Telecommunications

As of October, 1992, only 35 of 112 overseas locations had reliable, high speed telecommunications with A.I.D./W. Those who do not have reliable telecommunications communicate through diplomatic pouch mail (which may take up to three weeks to reach some posts) or through official State Department telegrams (cables). While cables may reach their destination the same day they are sent, they require excessive document preparation and management approval time for routine logistical operations.

U.S. Government operations overseas are supported by the Diplomatic Telecommunications Service Program Office (DTSPPO), jointly managed by the Department of State and other foreign affairs agencies. DTSPPO allocates a relatively modest line speed to A.I.D. at no cost. This is typically sufficient for FAX and low speed data transfers, but if A.I.D.'s requirements for moving data exceed this, the Agency must negotiate this with the DTSPPO, and must pay for higher speed

lines. Existing government policy requires that DTSP0 be the provider of communications services to all foreign affairs agencies wherever possible. However, DTSP0 has only very modest capabilities in some third world countries that are critical to A.I.D. If DTSP0 cannot support A.I.D. in a cost-effective manner, A.I.D. can, with DTSP0 concurrence, go to the private sector for alternative solutions. The Agency now uses a combination of satellite, dedicated line, and dial-up links in the various sites where DTSP0 facilities are not sufficient.

B. Computer Hardware and Software

Many of A.I.D.'s computers are saturated with demand and near collapse from old age. Many of the Wang minicomputers have suffered through 12 years of third world conditions including bad electrical power, dust, humidity, and sometimes inadequate preventive maintenance. The IBM 3083 mainframe in Washington is two generations behind current technology and frequently hits 90 per cent utilization. With a projected 12 per cent annual growth rate in demand, the mainframe is severely overloaded and usage may have to be rationed soon.

While the Agency has a mainframe computer, it has not used this platform to perform integrated computing. Most systems on the mainframe operate independently. Similarly, A.I.D./W and Mission systems are not well integrated, in part because they are built for different hardware platforms.

The Agency uses proprietary architecture (Wang) minicomputers in about 40 of its larger Missions and several of its larger A.I.D./Washington offices. Although this equipment met the requirements of its day, Wang has not kept up with newer technologies and the move to open systems of the Nineties. As a result, A.I.D. has failed to benefit from multi-vendor competition and paid inflated prices for what is now technically mediocre equipment. In fact, the annual costs of maintaining this equipment are almost as high as the costs of simply replacing it with comparably powerful open systems (UNIX) based servers, but this cannot take place until the software is developed for the new platforms. It is crucial

that the Agency accelerate its already begun shift away from this outdated architecture.

After several years of effort, installation of modern, standard desktop workstations, and the local area networks to connect them has been accomplished in about two thirds of the Agency's A.I.D./Washington offices, and about half of the overseas Mission population. However, many organizational units in Washington and in overseas Missions still operate with outdated, non-standard PCs, dumb terminals, or no desktop workstation at all for some employees.

■ Technology Needs

- ***Telecommunications.*** A global network with connectivity to every A.I.D. office is required. If A.I.D. business needs dictate that an office must be established in a given location, then the telecommunications infrastructure must be extended to support that office. A.I.D.'s decentralized decision-making requires a strong communications infrastructure for consistent and timely direction from Washington coupled with clear accountability reporting from the Missions. The nature of the communications link will be influenced by the size and needs of the office (i.e., is it an accounting station?), and by applicable security restrictions, but no office is too small to be cut off from the rest of the organization.
- ***Vendor Independence.*** Federal regulation, and common sense, reaffirm the Agency's ongoing move away from the current proprietary minicomputers to industry-standard "open systems" in order to reduce hardware and software costs. Open systems refers to computers (typically mid-range (or larger) platforms), which use an operating system that is standard across multiple vendors' hardware. As a result, applications are portable, and the Agency can choose "commodity" hardware based on price and performance, rather than being locked into one vendor's equipment because the application software built for it cannot be used on anything else.

- **Robustness and Reliability.** Hardware selection criteria must reflect the need to minimize resources that Missions have to invest in keeping standard systems running. (While this applies to both hardware and software, newer generations of both make the software maintenance and system administration more complex, while hardware maintenance has become simpler.) New platforms should be modular, allowing the relatively unsophisticated user to remove and replace a faulty board, and providing for redundancy in key components wherever feasible.
- **Scalability.** The location and size of A.I.D.'s field Missions can change quite rapidly. Accordingly, the Agency must be able to expand (or shrink) computer resources with a minimum of disruption. This requires both modular hardware, permitting, for example, easy installation of an additional processor board as network users expand, and application software which can run on a variety of platform sizes. Missions should be able to support growth with modest incremental investments and not "outgrow" smaller systems.
- **Distributed Processing.** System designs should take advantage of the power of desktop workstations in order to minimize sizing requirements of mid-size and central processors. For most A.I.D. corporate systems, PCs have been used to replace dumb terminals for connection to a minicomputer or the mainframe, meaning that all of the work was being done by the central processor, and the computing resources of the PC were untapped. PCs are too expensive to use as dumb terminals, and the costs of mid-size platforms can be reduced if they are not expected to carry all of the workload.
- **Security.** The technology architecture must protect A.I.D. data, particularly the growing amounts of classified data, from unauthorized access and from sabotage. This concern will take on increasing importance, given the requirements outlined in the previous section on application systems for paperless transactions, electronic signature, and electronic data interchange with contractors, clients and others.

- **Text Processing.** Document management must be supported by the Agency's technical architecture. Tools for managing textual data have not been practical in the past; however, significant strides are being made in this area, and the Agency's architecture needs to incorporate these new technologies in a cost-effective fashion.

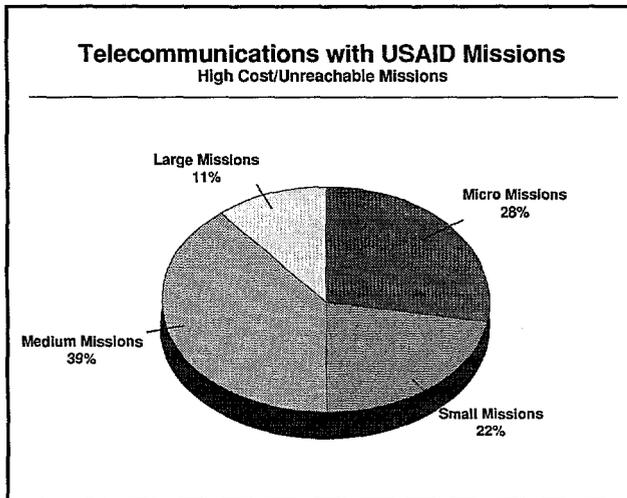
In short, the current architecture is not a viable option for A.I.D. If the Agency is to regain control of its information and accountability for its operations and expenses, it must design a consistent, robust architecture that eliminates wasteful duplication, provides reliable services, and delivers high quality, timely information that will permit Agency staff to do their jobs with confidence and efficiency.

■ Proposed Solutions

The ISP Technical Architecture team evaluated a wide variety of possible configurations capable of meeting the system requirements outlined above. No single solution was dictated by the system requirements; rather, the determining factor became one of cost. The possible options were narrowed to four alternative strategies for which detailed cost/benefit analyses were done. (See Volume II.) The architecture outlined below represents the most cost-effective choice for the Agency.

A. Telecommunications

The technical architecture team intensively studied options available to A.I.D. for robust global communications. The team found that approximately 80 per cent of A.I.D. Missions can be supported at relatively modest cost. It also found that all missions can be supported, although the cost may be very high for some. Most large Missions have telecommunications available at a reasonable cost, but many mid-sized and smaller Missions (e.g., Nepal, Zaire, Rwanda, etc.) are not readily accessible. Interestingly, it is not always the smallest posts that are the most diffi-



cult/expensive to reach, as shown in the illustration. For posts not served by DTSP0 or private carriers, A.I.D. could install satellite earth stations for transmission to a communications satellite. This approach is being used by the Department of State, the World Bank, and the United Nations in the third world, but it is costly. Satellite stations cost approximately \$75,000 for hardware and installation, and then carry roughly \$8 per minute connection charges. At this rate, sending a 50-page document from Washington to a Mission via satellite would cost approximately \$47.50.³ Transmission costs are clearly significant, and the architecture attempts to minimize the amount of data that must be transferred to meet the Agency's needs. On-line, interactive processing would be prohibitive, and the ISP team instead opted for less expensive batch file transfers.

The selected architecture envisions a combination of the available technologies, with DTSP0 support in most sites, private sector networks in some sites, and satellite links in those most difficult to reach. Cost-effective solutions for connectivity to Missions which are both small *and* hard to reach, or present special security concerns, will require careful analysis — but leaving them out

of the global Agency network is not a viable option if we are to achieve the objectives of point of origin data entry and easy data sharing.

The Agency will improve its efficiency in dealing with the larger development assistance community (PVOs, NGOs, universities, host country ministries, contractors, etc.), through transaction-based Electronic Data Interchange (EDI) and Electronic Mail, allowing both "structured" exchange, such as a vendor submitting an invoice electronically, or an "unstructured" dialogue via E-Mail. The architecture suggests a secure "fire-wall" communications controller that is the single interface between the outside world and A.I.D. systems to provide adequate security against hackers and viruses. Those in the outside world needing to communicate with A.I.D. will be registered beforehand with the gatekeeper machine which will allow them controlled access to only those A.I.D. resources for which they have been cleared.

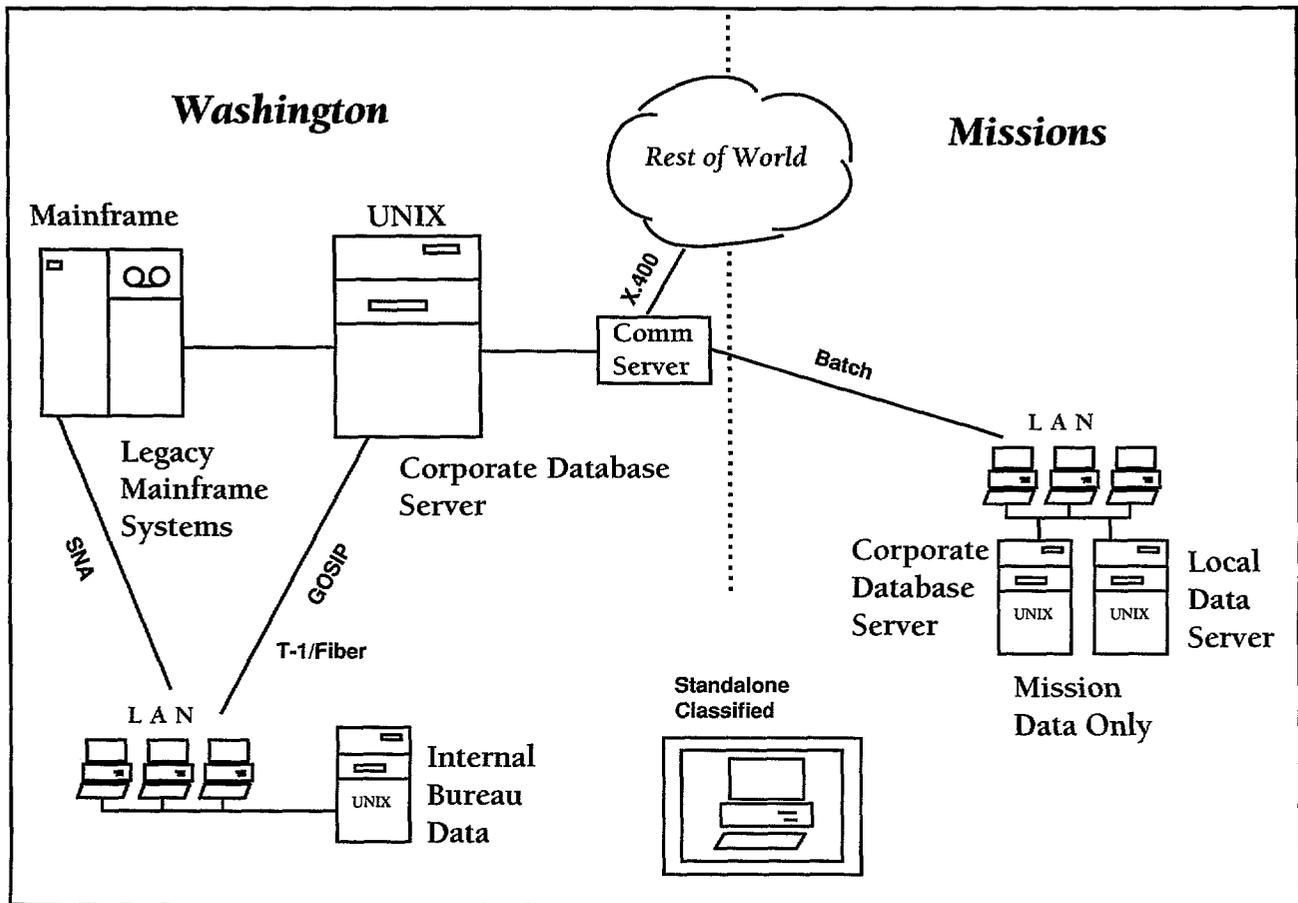
Exhibit 5 illustrates the proposed technical architecture for both Washington and a typical Mission. It depicts the link between Washington and the Missions for batch file transfer, showing each site with one or more local UNIX processors connected to LANs and PCs.

B. Computer Hardware and Software

A.I.D. has invested wisely in desktop PCs and local area networks, although the massive computational power of our desktop PCs has not yet been fully exploited. The new architecture implements the Client/Server model, where work is split between the PC on the desk (the client) and a database machine (the server). Because the PC does much of the work, a relatively small computer can play the role of the server. Additionally, by placing the work of displaying and editing the data locally, much faster, friendlier user interfaces can be implemented, and telecommunications can be minimized.

³ This assumes a 9.6Kbps circuit with 50 per cent effective throughput and 2 minutes of overhead for circuit establishment. Over a packet-switched public network, the document could be sent for about \$10, or the document could be sent at no charge through a DTSP0 circuit where available.

Exhibit 5: A.I.D.'s Proposed Technical Architecture



The server machines can be “commodity” machines sold by many vendors in a competitive marketplace. Basing the architecture on the POSIX-compliant⁴ UNIX operating system insures that many vendors will be competing to drive down price and improve quality. Additionally, the UNIX operating system supports a wide scale of machine sizes, from PCs to supercomputers. Satisfying another criteria defined in the systems environment, A.I.D. will

be able to run the same programs on small inexpensive machines in small Missions, midrange machines in large Missions, and large machines in A.I.D./Washington.

Although the technical architecture does not prescribe a specific vendor or part number⁵, an example of some feasible products might be useful. In a medium sized Mission that is also an accounting station, a Sun Microsystems SPARC

⁴ POSIX, Portable Operating System Interface, is mandated by the National Institute of Standards and Technology for government systems. POSIX is a standardized operating system interface which promotes the portability of computer applications among different vendors' equipment.

⁵ In fact, it is expected that multiple vendors will be used, depending on which is best able to provide support in that region of the world.

station could be configured with 128 megabytes of memory and 3 gigabytes of disk storage for less than \$40,000, including software. By way of comparison, recent Mission Wang minicomputer purchases have averaged in the \$200,000 range. A.I.D. can expect to achieve similar large scale reductions in the annual \$2 million expense for overseas maintenance of Wang minicomputers.

The role of the mainframe computer in the architecture will decline gradually over the years as new systems are developed which replace the older "legacy" systems. We can expect the demand for mainframe processing to increase approximately 12 per cent per year for the next two to three years and then begin to decline. The current mainframe does not have the capacity for the short-term growth, and will have to be upgraded one last time before mainframes are eliminated entirely from A.I.D.'s architecture.

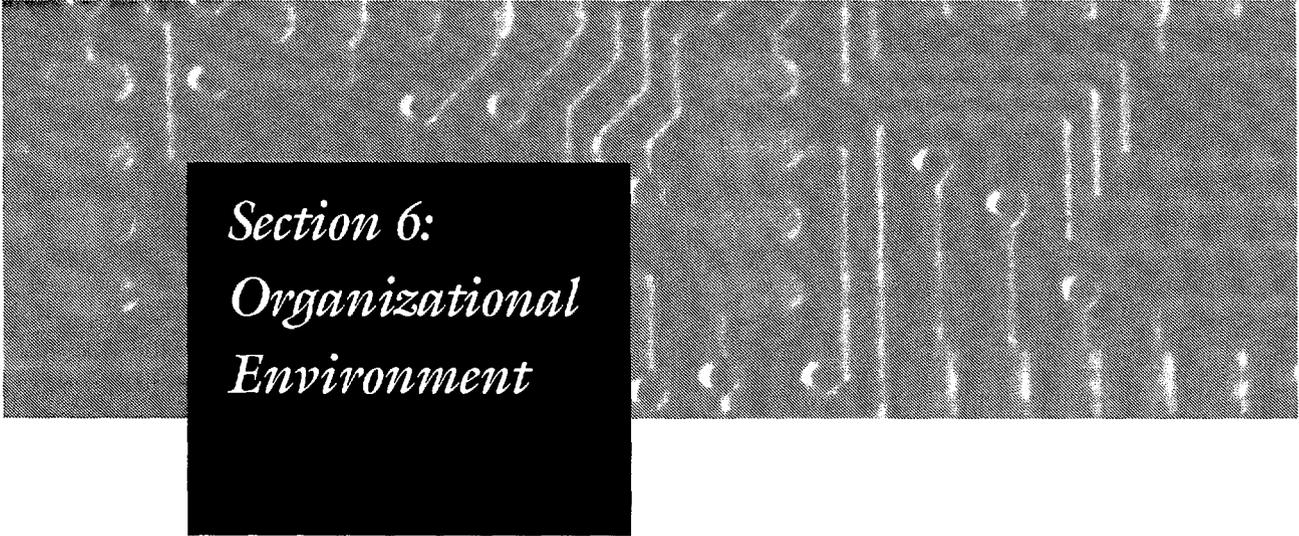
A.I.D. has recently selected Oracle as the Agency standard Relational Data Base Management System. Oracle will be used to create the integrated information systems giving users access to data from all business functions of A.I.D. A flexible end-user query system will allow users to write their own reports, perhaps with some minimal assistance from a help desk that is trained not only in technology, but in the Agency's data as well. Data administration and standards will insure that all business functions and all locations use data consistently, so it will be easy to aggregate data or allocate it as analysis requires.

The new technology architecture will require that hardware and telecommunications are sized to handle electronic movement of both text and data. Agency users will have on-line access to an index of available information (program data, external data sources, internal project documents, guidance), so that even if the data are not immediately accessible, the user can know what is available and where to get it. For example, a project officer reviewing the current status of a project might ask, "show me the statement of work, the latest contractor invoice, and the current balance for this activity." A Mission Director might ask, "show me Mission orders from other Missions which deal with the project approval process and the role of project committees." A document management

utility will provide for version control, indexing, and records management requirements. Large text databanks such as the collection of A.I.D. project papers, the A.I.D. handbooks, federal regulations, and other topics will be distributed through a text management system, using CD-ROM, or other suitable technology.

In conclusion, the proposed architecture meets the criteria of scalability, vendor independence, reliability and lowered costs for both acquisition and maintenance, and support for common software at all Agency sites. The telecommunications solution provides for access to all Agency sites while minimizing costs through local processing with batch transfers for data exchange.

However, the Agency's information management problems are not simply the result of antiquated systems and technology. They also stem from management practices, which are addressed in the following section.



Section 6: Organizational Environment

■ Definition

“Organizational Environment” refers to the organizational structure, the policies and procedures, and the assignment of responsibility for all aspects of information management and technology in an organization. While not as technically complex as the information, systems and technology issues discussed above, organizational issues can have a critical impact on the Agency’s ability to solve its information management problems. In fact, one outside consultant who participated in the ISP concluded that if the Agency fails to correct its information management problems, the most probable cause will be cultural and/or organizational, rather than technical problems.

■ Current Situation

IRM Organization

- The Agency’s IRM organization (FA/IRM) has not established central authority for information management/information technology (IM/IT) in the Agency. A recent GAO report pointed to a lack of delegated authorities, and the inability of “the IRM director [to] mandate agencywide use of IRM-sponsored systems.” In response to this and other criticisms, an

effort to completely rewrite the Agency’s IRM policies and procedures is underway.

- Historically, FA/IRM has been in a maintenance mode, and lacks an Agency business orientation. FA/IRM is now in transition, with the ISP study being the first major step toward reorienting both the organization and the Agency’s systems to more effectively support the Agency’s business functions.
- FA/IRM’s historical focus on administrative systems has fostered a perception that it has only a minor role or responsibility for program (vs. administrative) systems — to the Agency’s detriment. This has encouraged the development of stove-pipe systems that meet the needs of only individual program offices and which do not talk to one another.
- The lack of a data administration program has resulted in a “Babel” of information, with multiple conflicting estimates for most data. FA/IRM has developed data administration policies, but has not yet promulgated them Agency-wide.
- Users tend to view FA/IRM as a technical resource for hardware and network issues, but often not as a partner in building systems and managing information.

Agency Culture

- Despite the A.I.D.'s traditional reliance on field delivery of assistance, the Agency is witnessing the growth of A.I.D./Washington-based programs. The shift of staff from the field to A.I.D./Washington due to budget pressures favors creation of these programs, and of new reporting requirements for the field. Field offices are overwhelmed by the reporting burden imposed by A.I.D./Washington, both because of the workload it imposes, and the perception it gives of second guessing.
- Despite periodic shifts, the general consensus and trend in the Agency is toward increased delegation to the field. Recent management reviews have resulted in a restatement of the commitment to a strong field presence, and, importantly, the recognition of the need for information systems to monitor performance and support accountability.
- The Agency has perpetually underfunded the capital development component of corporate systems, perhaps overfunding maintenance. On the other hand, the total resources devoted to information management and technology across the Agency (over \$50 million annually) are more than sufficient to solve the many problems noted in the previous sections. The Agency has not focussed on IM/IT spending in a unified structure. The current pattern of allocating financial resources for IM/IT facilities:
 - *ad hoc* stovepipe systems and non-standard data;
 - perpetuation of old, dysfunctional corporate systems due to lack of centralized resources to replace them;
 - disincentives to improve the situation (e.g., A.I.D./W funds Missions' Wang maintenance, but the Missions are expected to fund replacement hardware — which yields savings to A.I.D./W, not to the Missions required to make the investment).
- Agency business and information managers are largely unable to conceive of how effective information management could transform the

Agency into a more efficient and better managed operation. However, there is a significant minority who do share this understanding.

- Solving A.I.D.'s information management problems will require several cultural shifts:
 - reduction of autonomy for many offices;
 - reengineering of many basic A.I.D. processes;
 - understanding and acceptance of the concept of corporate (i.e., shared) data;
 - increased coordination and understanding between FA/IRM and program staff of each other's needs, objectives, and business.

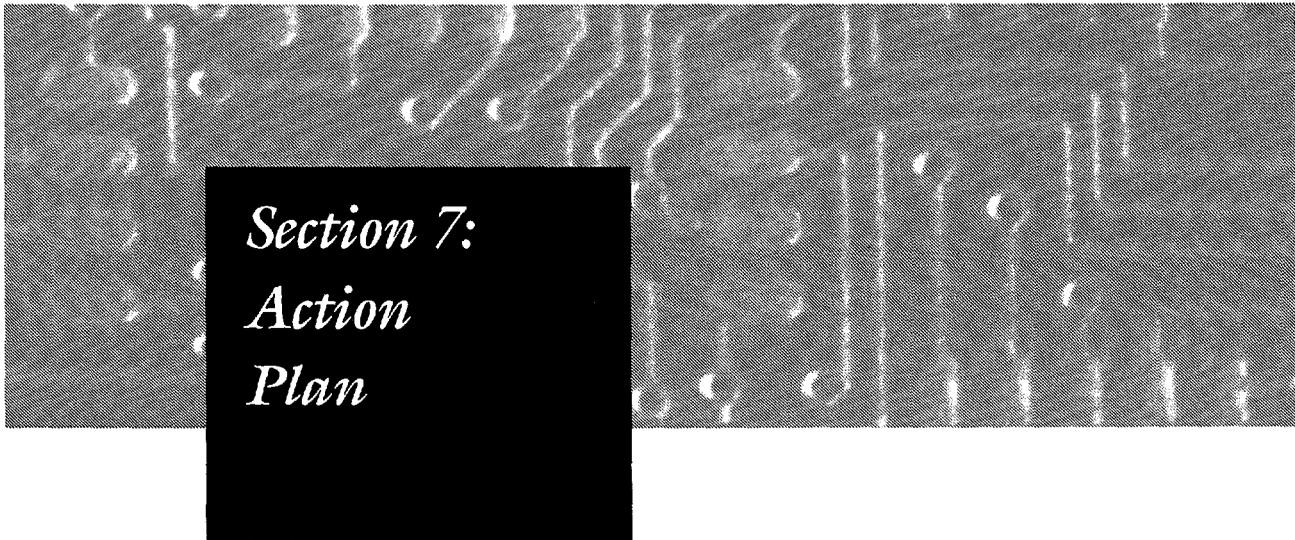
■ Organizational Needs

- Standards and policies must be put in place for data administration, system methodologies and basic platforms, security, and records management. (A.I.D. managers cannot be faulted for not following rules that don't exist.) Failure to follow standards and policies should be either documented as an approved exception, or result in loss of authority to operate/fund systems.
- Appropriate review and control mechanisms must be established to ensure compliance with policies and to assess their effectiveness.
- A structure needs to be imposed to review all IM/IT funding requests to avoid duplication and other unproductive forms of spending, and to ensure that Agency top priorities are funded first.
- FA/IRM staff need to renew their efforts to work closely with clients, learn the Agency's business better, and listen to and understand client needs.
- The Agency will need to make available key staff members to participate in system development efforts in order to ensure that the new systems truly meet the user community's requirements.

■ Proposed Solutions

Given the amount of criticism A.I.D. has suffered from its failure to properly control its data, some of the ISP team's outside consultants strongly recommended that A.I.D. should strictly centralize all data storage, all processing, and all software development as a means of securing the integrity of its information. However, A.I.D.'s unique mission strongly favors a decentralized style of operation and management. Thus, the distributed architecture defined in the previous section places substantial responsibility for the integrity of A.I.D.'s data on those closest to the data, the business managers in Missions and Washington offices. Policies, training, and accountability structures must be put in place to guarantee the success of A.I.D.'s information programs:

- Standards will be written and published in a revised Handbook 18 in FY 93. Major topics include:
 - Roles and Responsibilities of Officials and Offices
 - Planning and Budgeting for IM/IT
 - Definitions and Standards for Corporate Systems
 - Data Administration
 - Acquisition of Information Technology
 - Telecommunications Management
 - Computer Security
- Appropriate controls will be established through the budget and procurement functions to ensure compliance with standards. Agency offices will not be permitted to fund/procure systems and hardware which tend to perpetuate the Agency's information management problems, or to collect and maintain data already collected by other offices.
- A system of delegations will be established covering all Agency IM/IT activities, through the Designated Senior Official, as required by the Paperwork Reduction Act.
- A subcommittee of the IMC will be established to recommend Agency-wide systems priorities through an annual review process tied to the Annual Budget Submission (ABS) and strategic planning processes.
- FA/IRM's "IRM Review" program will be redefined and strengthened, with a focus on working with offices and Missions to develop information management programs and systems which are effectively integrated with Agency-wide information needs.
- Security controls for all systems will be tightened and supported by increased training and internal review.
- The IMC will oversee the participation of user representatives in system projects, in order to ensure adequate, high quality representation.


 A graphic for Section 7: Action Plan. It features a dark, textured background with a central black rectangle containing the text "Section 7: Action Plan" in a white, serif font.

Section 7: Action Plan

The preceding sections have outlined a set of requirements that represent an enormous task for A.I.D. — essentially the replacement of its entire information systems inventory, and the upgrading of much of the hardware on which those systems run. In the aggregate, this is expected to be the largest information systems project the Agency has ever undertaken, and, when fully implemented, will affect the daily working lives of over 8,000 A.I.D. employees. Even assuming no resource constraints, the problems of scheduling and managing such a project are formidable. Given the agency's tight budgets, the challenge is even greater, but it is precisely for this reason that the Agency must address its plethora of inconsistent and nonintegrated systems. The costs of doing nothing include a continued, largely non-focussed expenditure of some \$50 million annually for information technology and systems, and the uncalculated costs of the inefficient management practices (e.g., rekeying data, preparing unnecessary reports) that these systems foster.

■ Key Assumptions

The following paragraphs describe some of the key underlying assumptions that were developed in building the plan:

- Each business function previously identified will require a separate Business Area Analysis (BAA), with duration varying depending on complexity. The BAA for Core Accounting has already been done as a part of the AWACS project; the remaining seven will vary in duration from two to six months. In order to ensure adequate management of these projects, and to allow for the learning curve with the new methodology, no more than two BAAs will be initiated in the first year. An ongoing development coordination function will ensure that each BAA is consistent with the overall Agency data model.
- The information engineering methodology relies, to a large degree, on the active, and intensive participation of users in the design and development process. Users will be an integral part of the development team for the life of the project, and, for most projects, a user will be assigned the role of project manager. It is critical that the Agency select and assign its "best and brightest" staff to participate in this process. A means of ensuring that Mission needs are adequately reflected must be worked out, whether through TDY assignment of Mission staff at key parts of the process, by assigning staff just rotated back to Washington for full participation in the project, or through trips by the development team to selected Missions.
- Prior to initiation of the BAAs, FA/IRM will need to put in place a number of policies and standards, and new organizational structures to

handle project coordination, data administration, etc. This necessary lead time will also provide for the selection, scheduling and training of key users to be involved in the first projects. Another effort that must be initiated is the preparation of a cost/benefit analysis for the overall ISP project. This analysis will attempt to capture the project's impact on total Agency information management and technology spending.

- Each BAA will be followed by one to four concurrent Rapid Application Development (RAD) projects, software beta testing at one or more sites, followed by fielding. Detailed strategies must be developed to coordinate the installation of hardware and software, and to provide the training for each new system at the Agency's many remote sites. The difficulty of conducting world-wide training will mean that system design will have to stress simplicity. In addition, the need to manage a staggered implementation schedule (i.e., at any given point in the implementation schedule, some sites will be using the new software, and some will be using the old system or manual procedures) will require careful planning and, possibly, some temporary bridging systems.
- Much of the software for the candidate systems will be generated by CASE tools, or through the fourth generation language facilities of the newly selected relational data base management system, Oracle. The development team will make extensive use of prototypes. Prototyping involves the rapid development of test applications to which users can react and suggest modifications. The use of a Common User Interface (CUI) for all systems should simplify design and speed parts of construction. Finally, wherever possible, off-the-shelf software, from commercial sources or other agencies will be used. All of these techniques will require less resources than traditional software development methods, permitting the completion of an effort of this magnitude within a reasonable time span and budget.
- A suite of reduced-functionality software will be developed for smaller Missions lacking staff and direct responsibility for such functions as accounting or procurement. This software will provide automated interfaces to all Agency business functions (e.g., initiate a procurement request, submit a travel voucher) even if those functions are processed in another office. It will provide full functionality for those functions performed by all Missions regardless of size (e.g., budget preparation, planning and tracking projects).
- A number of special projects will cut across business areas, and will need to be staffed and managed in close coordination with ongoing development in other areas. For example, the current project to establish a Portfolio Management reporting system in the first half of FY 93 will initially provide a relatively unsophisticated reporting mechanism for the field. This will then evolve gradually as each new business system is implemented, replacing manual input for that module with an automated interface. Other special projects may include the integration of the PRISM project into the new, integrated set of systems.
- The AWACS project, which began several years ahead of the ISP and is scheduled for implementation in A.I.D./Washington at the start of FY 95, will require that certain assumptions be made about the nature of the interface from related systems yet to be designed. For example, the procurement system will need to provide for recording the receipt of goods and services received, which will also affect the accounts payable module of AWACS. Close coordination will be required between the ISP team and the AWACS team to ensure that assumptions/decisions driven by AWACS do not restrict the functionality of related systems. The Development Coordination Initiative is designed to provide this oversight and coordination. In addition, as soon as the AWACS design is finalized, a separate project to define a subset of the core accounting system to be adapted for Missions will be initiated.
- The Plan assumes the completion of the installation of PCs and LANs for all A.I.D. workers requiring workstations. This has been an ongoing effort for a number of years. It is estimated that another 750 staff remain to be equipped in Washington, at a cost of \$2.3 million. In the Missions, an appreciably larger number of staff still need to be equipped, with an estimated cost

of \$15.8 million. New mechanisms for the funding of this equipment may need to be developed, in order to ensure that it is in place before the applications software is ready for installation.

■ Prioritization

Given the scope of the effort facing the Agency, projects must be prioritized so as to maximize the payback while at the same time permitting the overall effort to move forward as efficiently as possible. The ISP team considered a number of factors in developing the proposed Action Plan. The starting point was the business area priorities as expressed by the ISP Steering Committee (and other users). These were as follows:

- | | |
|----------------|--|
| High: | Core Accounting
Operations Management
Annual Budgeting |
| Medium: | Procurement
Workforce Management
Property Management |
| Low: | Communications
Guidance Management |

Overlaying this straightforward delineation of users' needs, however, is a long list of additional considerations:

- Dependencies — does one project/system require another to be in place first?
- Recommendations from external studies of the Agency.
- Resource availability — heavy staff involvement from both FA/IRM and user organizations will be required.
- Scheduling — the need to coordinate hardware acquisitions with software development (i.e., hardware must be installed before software can be fielded).
- Installation strategies — how do we cost-effectively deliver, install and train users on the new technology in every Mission?

- Current vulnerabilities — the need to reduce the Agency's dependence on Wang, particularly as regards overseas maintenance, and the need to solve short-term mainframe capacity problems.
- Interface problems — the potential costs of building temporary, throw-away interfaces between surviving legacy systems and "early" new systems.
- Learning curve issues — is there a project that is a better choice for the inevitable learning that will take place as we first try out the new RAD methodology? Will this project have a quick payback for the users?

In addition to this long list of technical considerations, there is a basic issue of organizational focus which always arises in projects of this magnitude: How long can the Agency stretch out this project before it dies of its own weight or is overtaken by events? In developing the proposed Action Plan, all of these issues were taken into account. The following project descriptions summarize the major initiatives of the plan.

■ Project Timing and Total Costs

The first point to be made about this Action Plan is that, despite its specificity, there is much that we do not know yet. The BAA process defined in the methodology will provide much more specific answers to the questions about what kind of systems we need, and how they should be implemented. In addition, the passing of time will undoubtedly raise new issues and information needs to the top of management's priority list, and plans will have to be adjusted. For these reasons, this Plan includes provision for an annual ISP Plan review. This review will update the plan, measure progress against goals, and make adjustments necessitated by changing events and new knowledge gained as a result of progress made on the plan.

The 14 major initiatives outlined in Exhibit 6 represent a set of proposed priorities which attempts to balance all of the competing factors outlined above. The initiatives consist of one for

One other factor considered in modelling the costs was the issue of total annual work-year (contractor or direct hire) requirements versus peak staffing requirements in any given month. Various scenarios were modelled to assess their effect on project timing and duration, and the proposed Plan assumes a maximum of 10 FA/IRM direct hires and 46 contractors. Note

that the relatively high numbers of user FTEs include both participation in the development process and training of staff Agency-wide. Peak staff involvement for any individual office or Mission should be relatively modest and brief.

Exhibit 7: Total ISP Capital Costs

<u>Direct ISP Costs</u>	<u>FY 93</u>	<u>FY 94</u>	<u>FY 95</u>	<u>FY 96</u>	<u>FY 97</u>	<u>Total</u>
FTEs:						
FA/IRM	8	9	7	7	4	
Users	9	17	72	35	29	
Contractor WYs	23	34	43	35	16	
Costs: (\$000)						
Contractor Staff	1,686	2,646	3,450	2,912	1,370	12,064
Hardware/Software	996	4,912	9,836	4,968	0	20,712
Travel	240	429	1,677	605	595	3,546
Initial Estimate of Security Requirements	<u>0</u>	<u>2,000</u>	<u>3,000</u>	<u>3,000</u>	<u>2,000</u>	<u>10,000</u>
Total ISP Costs	2,922	9,987	17,963	11,485	3,965	46,322
<u>Related Ongoing Costs:</u>						
AWACS Project Complete Installation of PC/LANs (A.I.D./W and Missions)	3,496	2,500	700	700	300	7,696
	<u>10,200</u>	<u>7,900</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>18,100</u>
Total Related Costs	13,696	10,400	700	700	300	25,796

One of the greatest areas of uncertainty is implementation costs. As noted above, new strategies will have to be developed to permit the smooth introduction of new technology and a completely new set of software while minimizing disruption at the Agency's many operating sites. This includes the need to develop strategies for conversion of existing systems data for both Washington and the Missions. As implementation strategies are developed, it may be possible to reduce cost estimates in this area.

Inflation assumptions are built in for contractor staff. However, for hardware and software, inflation was assumed in some cases consistent with current trends, but for other items, prices were presumed to decline over time.

Note that Exhibit 7 shows only total capital investment costs. It does not reflect the impact on any of the Agency's current IM/IT spending. For FA/IRM, however, it seems clear that in order to meet the challenge of completely redesigning all of the Agency's corporate systems, some resources will need to be reallocated from the nearly \$4 million annual cost of maintaining old systems — systems now identified as soon to be discarded. This will require careful negotiations with FA/IRM's clients to strike the correct balance. Even if resource constraints did not make this necessary, prudent management dictates that the Agency minimize its investment in throw-away systems.

Beyond these adjustments to FA/IRM's budget, the Plan identifies the need for a cost/benefit analysis to be conducted as one of the first steps. This analysis will attempt to accurately capture all of the Agency's IM/IT spending (as mentioned above, the known portion exceeds \$50 million per year), and to identify where these expenditures can be reduced as a result of the ISP. This effort will also form the basis for the annual reviews of the Plan, and the setting of priorities for systems project funding across the Agency.

■ Individual Initiative Descriptions

Each of the 14 major initiatives shown in Exhibit 6 is described below, including a Gantt chart showing high-level milestones, and a summary budget. More detailed descriptions and charts are contained in Volume II of the ISP.

Annual ISP Planning

As discussed above, the costs, tasks, and milestones for the ISP project will continue to be refined as the project progresses. This initiative provides for a formal review of all Agency IM/IT spending plans, and a mechanism for setting priorities and ensuring that the most critical projects are funded first. This annual review should also serve as a starting point for defining IM/IT items to be included in the budget process.

Also included in this initiative is the cost/benefit analysis discussed above, which will attempt to more accurately measure the total Agency spending on IM/IT, and to assess the impact on that spending of the ISP.

Costs for this initiative are minor, estimated at 0.3 contractor work-years in the first year, and 0.1 work-years in subsequent years.

ISP Start-Up

There are a number of significant tasks which must begin immediately in order to establish the foundation for the ongoing ISP effort. These include the implementation of certain organiza-

tional and procedural changes in FA/IRM, and training for both IRM and selected user staff on the new methodology. Costs for this initiative are relatively modest, totalling \$158,000, 0.5 FA/IRM FTEs, and 2.1 Contractor Work Years, all in the first year of the plan.

Exhibit 8: ISP Start-Up

Task Name	1993	1994	1995	1996	1997
ISP Start-Up	■				
General IE Training 1	■				
General IE Training 2	■				
Develop Platform Standards	■				
Establish CASE/Repository Platform	■				
Establish Central Repository Management	■				
Establish Change Review Board	■				
Establish Computer Security	■				
Establish Configuration Management	■				
Establish Data Administration	■				
Establish Data Base Administration	■				
Establish Quality Assurance	■				
Establish Software Reuse Control	■				
Operating Platform Standards	■				
Publish Software Devel. Methodology & Standards	■				
UNIX Utilities Selection	■				

Open Systems/World-Wide Network Installation

As previously noted, the ISP Action Plan assumes that the Agency will complete its installation of desktop workstations connected by local area networks (LANs). This initiative takes the technical architecture the next step, replacing existing Wang platforms with open system (UNIX) hardware, and installing the telecommunications links where these do not already exist. The open system platforms, which cost far less and are simpler to maintain than the Wang systems, will enable the Agency to extend mid-range computing power even to smaller offices and Missions which

did not have access to anything but PCs before. The telecommunications links will provide for the rapid exchange of data between Missions and Washington, as well as Mission-to-Mission where one site serves as, for example, the accounting station for others. This initiative spans almost the entire five years of the plan, and is a prerequisite for each site where the new applications systems will be fielded. Detailed, site-by-site plans will need to be worked out. Those Missions that have already ordered UNIX equipment will logically become the first to receive the new applications software as it is developed. The costs shown for this initiative are primarily hardware related. Some contractor support will be required to facilitate installation and training.

Exhibit 10: Open Systems/World-Wide Network Initiative

Task Name	1993	1994	1995	1996	1997
Open Systems/Worldwide Network	██████████	██████████	██████████	██████████	██████████
Network Management	██████████	██████████	██████████	██████████	██████████
Site Transition Planning	██████████				
H/W, S/W Installation (Yr 1)	██████████				
H/W, S/W Installation (Yr 2)		██████████			
H/W, S/W Installation (Yr 3)			██████████		
H/W, S/W Installation (Yr 4)				██████████	

Resources for this initiative are as follows:

	<u>FY 93</u>	<u>FY 94</u>	<u>FY 95</u>	<u>FY 96</u>	<u>FY 97</u>	<u>Total</u>
IRM FTEs	1.1	0.5	0.1	0.1	0.1	
User FTEs	0.2	0.4	0.7	0.4	0.0	
Contractor WYs	2.3	2.2	2.5	1.8	0.7	
Contractor						
Costs (\$000)	170	172	203	153	66	764
Equipment Costs	996	2,469	4,939	2,494	0	10,898
Travel	240	309	258	129	0	936
Software	0	2,443	4,897	2,474	0	9,814
Total	1,406	5,393	10,297	5,250	66	22,412

Core Accounting Initiative

The design and development of the core accounting system is an ongoing project known as AWACS. Development coordination between AWACS and the other initiatives will be a critical requirement of the overall ISP effort. Because the AWACS project was begun before the ISP,

some systems which will need to interface with the accounting system may require modifications in the AWACS design. The budgeted costs of the AWACS project are not included below. However, the ISP does include the design and implementation of a replacement for the Mission Accounting and Control System (MACS), based on a subset of the AWACS functionality.

Exhibit 11: Core Accounting Initiative

Task Name	1993	1994	1995	1996	1997
Core Accounting	██████████	██████████	██████████		
AWACS	██████████	██████████			
CEFMS Evaluation	█				
Budget Execution & Funds Control RAD	████				
Receiving & Accounts Payable RAD	████				
Accounts Receivable & Credit Mgt RAD	███				
General Ledger RAD	███				
Cost Accumulation RAD		███			
MACS Modernization	██████████				
MACS Beta Test			█		
MACS Implementation			██████████		

Resources for this initiative are as follows. (Note that the heavy requirements for user involvement in the later years in this as well as other business area initiatives represents user training in offices across the Agency.)

	<u>FY 93</u>	<u>FY 94</u>	<u>FY 95</u>	<u>FY 96</u>	<u>FY 97</u>	<u>Total</u>
IRM FTEs	0.2	0.2	0.0	0.0	0.0	
User FTEs	1.8	0.9	19.1	0.5	0.0	
Contractor WYs	1.1	1.2	5.6	0.2	0.0	
Contractor						
Costs (\$000)	78	97	457	13	0	645
Installation Travel	<u>0</u>	<u>0</u>	<u>403</u>	<u>11</u>	<u>0</u>	<u>414</u>
Total	78	97	860	24	0	1,059

Procurement Systems Initiative

The procurement process is the first business area proposed for formal analysis and development (aside from the ongoing AWACS project). There are a number of reasons for this. The current contract management information system (CIMS) has limited functionality in that it does not support the entire procurement life cycle. It is dependent on the Wang platform, which the Agency is phasing out. It is installed in only a small number of Missions, and the Presidential Commission has recommended that it be expanded to all Agency sites. The procurement system will have extensive interfaces with

AWACS, and the AWACS project is dependent on certain design decisions being made so they can be reflected in the design of AWACS.

The procurement system is projected to be one of the most complex initiatives, with a six-month Business Area Analysis, followed by four concurrent RAD development projects. It will be beta tested in Washington first, and then in one or more selected Missions. Some consideration was given to scheduling this complex project later in the ISP Action Plan, but given all of the reasons cited above, it is being proposed as the first business area.

Exhibit 12: Procurement Systems Initiative

Task Name	1993	1994	1995	1996	1997
Procurement	████████████████████				
BA Analyses	██████				
Procurement Planning RAD		██████			
Award Procurement RAD		██████			
Contract Administration RAD		██████			
Procurement Evaluation RAD		██████			
Procurement Beta Test		██████			
Procurement Implementation			████████████████		

Resources for this initiative are as follows:

	<u>FY 93</u>	<u>FY 94</u>	<u>FY 95</u>	<u>FY 96</u>	<u>FY 97</u>	<u>Total</u>
IRM FTEs	0.8	0.6	0.0	0.0	0.0	
User FTEs	2.3	4.0	18.0	0.0	0.0	
Contractor WYs	4.5	6.4	5.1	0.0	0.0	
Contractor						
Costs (\$000)	336	500	417	0	0	1,253
Installation Travel	<u>0</u>	<u>34</u>	<u>380</u>	<u>0</u>	<u>0</u>	<u>414</u>
Total	336	534	797	0	0	1,667

Annual Budgeting Systems Initiative

The second proposed major business area is Annual Budgeting. This, too, is a critical prerequisite for the AWACS project, with the need for Budget and Financial Management staffs to jointly define cost categories and other data to be captured in budget plans, and then measured in the core accounting system. While this process is critical to all of the Agency's work, it is expected to be a less complex project than the Procurement System. The budgeting system must be installed in every Office and Mission in the Agency, to be used largely by non-specialists. Concentrated use of the

new system will occur in a relatively short time period when the entire Agency is preparing the Annual Budgeting Submission (ABS). Thus, this system does not readily lend itself to a staggered implementation schedule, reinforcing the need for a simple user interface. The Plan shown in Exhibit 13 calls for beta testing in selected offices in FY 94, and then full implementation in FY 95 in time for the preparation of the ABS submission. (Those offices that do not have the open systems hardware installed at that point may not be able to implement the new budgeting system until FY 96.)

Exhibit 13: Annual Budgeting Systems Initiative

Task Name	1993	1994	1995	1996	1997
Annual Budgeting					
BA Analyses					
Budgeting RAD					
Budgeting Beta Test					
Budgeting Implementation					

Resources for this initiative are as follows:

	<u>FY 93</u>	<u>FY 94</u>	<u>FY 95</u>	<u>FY 96</u>	<u>FY 97</u>	<u>Total</u>
IRM FTEs	0.3	0.3	0.0	0.0	0.0	
User FTEs	0.6	2.3	5.3	0.0	0.0	
Contractor WYs	0.8	3.2	2.3	0.0	0.0	
Contractor						
Costs (\$000)	60	248	183	0	0	491
Installation Travel	<u>0</u>	<u>40</u>	<u>167</u>	<u>0</u>	<u>0</u>	<u>207</u>
Total	60	288	350	0	0	698

Operations Management Initiative

Operations Management includes a number of fairly diverse applications. This business area includes the maintenance and use of sectoral data (e.g., data on population, health, etc.), formal project planning and tracking tools, and management reporting and evaluation systems, including the integration of the PRISM project into the Agency's integrated suite of corporate systems. The ISP team will attempt to identify a commercial project planning tool that can be adapted to meet the Agency's needs, rather than reinventing such a product from scratch.

This initiative is slated to begin in early FY 94, and will draw on information developed and issues identified in the Procurement and Budgeting initiatives, as well as the AWACS project. A six-month BAA will be followed by four concurrent RAD projects. In addition, the BAA process will determine whether specialized program areas, such as Participant Training and Food for Peace, can be incorporated into the common project management application, or whether they will continue to require specialized systems.

Exhibit 14: Operations Management Initiative

Task Name	1993	1994	1995	1996	1997
Operations		██████████	██████████	██████████	
BA Analysis		██████			
Strategic Project Planning RAD		██████			
Project Implementation Planning RAD		██████			
Project Implementation Management RAD			██████		
Project Evaluation RAD		██████			
Operations Beta Test			██		
Operations Implementation			██████████	██████████	

Resources for this initiative are as follows:

	<u>FY 93</u>	<u>FY 94</u>	<u>FY 95</u>	<u>FY 96</u>	<u>FY 97</u>	<u>Total</u>
IRM FTEs	0.0	1.1	0.2	0.0	0.0	
User FTEs	0.0	3.5	11.7	8.6	0.0	
Contractor WYs	0.0	7.5	5.0	2.5	0.0	
Contractor						
Costs (\$000)	0	589	405	207	0	1,201
Installation Travel	<u>0</u>	<u>0</u>	<u>233</u>	<u>181</u>	<u>0</u>	<u>414</u>
Total	0	589	638	389	0	1,615

Workforce Management Initiative

Workforce Management includes the distinct processing requirements for the Agency's three different workforces: U.S. direct-hires, foreign service nationals, and personal services contractors (PSCs). Because of the diversity in the Agency's workforce, it also includes a project to support the needs of the Workforce Planning function to look at these groups on an integrated basis. Also included in this initiative is a Travel Management system.

Currently, U.S. direct hires and PSCs are managed and paid directly through A.I.D. systems. A study was begun recently to identify another

agency to provide standard personnel and payroll processing for U.S. direct hires, and it is unclear whether a similar approach may be used for the other two categories in the workforce. Many Missions already use the services of the State Department's regional processing facilities for handling foreign national personnel/payroll, but others have elected to develop their own systems. The Business Area Analysis will identify commonalities among all categories in the workforce, and begin to explore whether these needs can be met by a single, integrated system, and whether outsourcing of this function, as recommended by OMB, is feasible. The BAA begins in late FY 94, followed by four broadly defined RAD projects.

Exhibit 16: Workforce Management Initiative

Task Name	1993	1994	1995	1996	1997
Workforce Management			██████████	██████████	██████████
BA Analysis			██████		
Workforce Planning RAD				██████	
Workforce Administration RAD				████	
Career Development RAD				████	
Payroll RAD			██████		
Workforce Management Beta Test				██	
Workforce Management Implementation					██████████

Resources for this initiative are as follows:

	<u>FY 93</u>	<u>FY 94</u>	<u>FY 95</u>	<u>FY 96</u>	<u>FY 97</u>	<u>Total</u>
IRM FTEs	0.0	0.1	0.8	0.6	0.0	
User FTEs	0.0	0.2	2.5	7.1	14.8	
Contractor WYs	0.0	0.2	5.2	7.3	4.2	
Contractor						
Costs (\$000)	0	18	419	619	372	1,428
Installation Travel	<u>0</u>	<u>0</u>	<u>0</u>	<u>101</u>	<u>313</u>	<u>414</u>
Total	0	18	419	720	685	1,842

Guidance Initiative

Guidance is a critical function in managing A.I.D., given the remoteness of many of the Agency's sites, and the practice of delegating authorities to the field. Guidance includes the A.I.D. handbooks, orders, directives, etc. issued from Washington, as well as Mission Orders issued in the field. There are two central issues to improving this function. One is to clean up the often conflicting, poorly indexed and voluminous existing guidance. The second issue is to improve the accessibility of guidance. The ISP effort does not directly address the first issue, but the application of technology can greatly improve the second. In discussing this issue with the staff of several Missions, the ISP team found some sentiment for waiting until the guidance had

been overhauled before applying technology to it; hence, the proposed start of this Business Area Analysis in FY 95. However, even relatively simple technological solutions such as the proposal to issue the Handbooks and other guidance on indexed CD-ROM disks may facilitate the more labor-intensive issue of cleaning up the guidance. Based on preliminary analysis, it appears that savings can be achieved by publishing the A.I.D. Handbooks on CD-ROM even if this turns out not to be the ideal solution for the long term; thus the schedule calls for an early analysis and implementation of CD-ROM, followed later in FY 95 with a formal BAA to look at this function in more depth. Specific hardware costs for this initiative are not identified. However, they are expected to be under \$100,000.

Exhibit 17: Guidance Initiative

Task Name	1993	1994	1995	1996	1997
Guidance					
BA Analysis					
Guidance Formulation RAD					
Guidance Management Beta Test					
Guidance Implementation					
CD-ROM Handbooks					

Resources for this initiative are as follows:

	<u>FY 93</u>	<u>FY 94</u>	<u>FY 95</u>	<u>FY 96</u>	<u>FY 97</u>	<u>Total</u>
IRM FTEs	0.0	0.0	0.2	0.2	0.0	
User FTEs	0.0	0.0	0.4	2.1	5.2	
Contractor WYs	0.3	0.0	0.4	2.7	2.2	
Contractor						
Costs (\$000)	20	0	36	225	197	478
Installation Travel	<u>0</u>	<u>0</u>	<u>0</u>	<u>41</u>	<u>166</u>	<u>207</u>
Total	20	0	36	266	363	685

Communications Initiative

The Communications initiative is concerned with the management of external communications. This includes integrating the recently developed correspondence tracking system with other new applications, to meet the needs of headquarters

organizations which must coordinate the responses to the numerous requests for information and general correspondence coming into the Agency. Like the Guidance initiative, this function was not rated as a high priority by the ISP Steering Committee, and thus is not scheduled to begin until late FY 95.

Exhibit 18: Communications Initiative

Task Name	1993	1994	1995	1996	1997
Communications					
BA Analysis					
Communications RAD					
Communications Beta Test					
Communications Implementation					

Resources for this initiative are as follows:

	<u>FY 93</u>	<u>FY 94</u>	<u>FY 95</u>	<u>FY 96</u>	<u>FY 97</u>	<u>Total</u>
IRM FTEs	0.0	0.0	0.2	0.1	0.0	
User FTEs	0.0	0.0	0.4	4.2	2.6	
Contractor WYs	0.0	0.0	0.4	1.3	0.4	
Contractor						
Costs (\$000)	0	0	36	107	33	176
Installation Travel	<u>0</u>	<u>0</u>	<u>0</u>	<u>124</u>	<u>83</u>	<u>207</u>
Total	0	0	36	231	115	383

Fielding "Class II" Software

The ISP team developed the concept of a reduced functionality set of software which will still permit smaller Missions to accomplish all of their functions in an automated fashion. Thus, a "Class II" site would not have the authority/software to accomplish large procurements, but it would have automated tools to plan for and request such acquisitions, and to track their status and cost. This approach is based loosely on the concept of the Mission Management Information System (MMIS) developed for the Wang platform and in use in some Missions. Because the Agency's distribution of business functions across Missions is not uniform (i.e., there are 23 sites with Contracts Officers, 42 sites that are accounting stations, etc.), the

design of this system must be modular, and fielding it will require detailed planning. While it is intended to automate all business functions even for the smallest Missions, it must be extremely simple to use and manage, as small Missions cannot devote significant staff resources to training or system operation.

Work on this system will be incremental, with portions being developed as a part of the RADs for the other business areas. Thus, it begins in FY 94, with the Procurement RADs, and continues through FY 96, when the last business areas are completed. It is expected that some additional development may be necessary in FY 96, to further integrate and streamline all of the functions as a unit.

Exhibit 19: Class II Software

Task Name	1993	1994	1995	1996	1997
Small Mission Software					
Small Mission Package RAD					
Small Mission Package Implementation					

Resources for this initiative are as follows:

	<u>FY 93</u>	<u>FY 94</u>	<u>FY 95</u>	<u>FY 96</u>	<u>FY 97</u>	<u>Total</u>
IRM FTEs	0.0	0.0	0.1	0.1	0.0	
User FTEs	0.0	0.1	4.5	3.0	9.0	
Contractor WYs	0.0	0.4	2.0	1.2	0.0	
Contractor						
Costs (\$000)	0	31	162	104	0	297
Installation Travel	0	0	75	51		126
Total	0	31	237	155	0	423

Special Projects Initiative

Special projects are defined as projects that cut across several business functions. Three such projects have been identified in the plan, and provision has been made for supporting others yet to be defined, in the later years of the plan. One special project is the Portfolio Management System called for in the Agency's Management Improvement Plan. This is expected to include the development and fielding of a relatively simple reporting system for field sites, and the gradual updating of this system by integrating each new module of the Agency's corporate systems as they are brought on line, until the system is entirely automated.

A second project concerns the need for more efficient management of, and access to, textual and graphical information. The current paper and micrographics-based approach to records management and information dissemination is being re-examined, and new technologies offer the potential for reduced costs and immediate

access to documents from anywhere in the Agency.

Another cross-cutting project concerns the need to bring modern information management and operations research tools to bear on the Agency's admittedly disjointed information resources, in order to provide Agency management with the information and analysis it needs to support the decision process. The project will evolve as the Agency's antiquated systems are replaced, one-by-one, with modern, integrated systems. As this occurs, the staff will be able to shift its efforts from merely retrieving and massaging data to more sophisticated analysis. This project is designed to address the concerns of the Agency's top management that they lack key decision-making information.

Other special projects may be required to meet the particular needs of the Inspector General staff. While many of the common Agency corporate systems should meet the IG's requirements, some special arrangements for either software or telecommunications may be necessary.

Exhibit 20: Special Projects

Task Name	1993	1994	1995	1996	1997
Special Projects					
Portfolio Management System RAD					
Decision Support Tools RAD					
Provide DSS Services					
Conduct Special Projects					
Text/Image Management Technology Study					
Text/Image Management RAD					
Text/Image Management Beta Test					
Text/Image Management Implementation					

Resources for this initiative are as follows:

	<u>FY 93</u>	<u>FY 94</u>	<u>FY 95</u>	<u>FY 96</u>	<u>FY 97</u>	<u>Total</u>
IRM FTEs	2.3	2.5	2.0	2.5	1.5	
User FTEs	3.1	3.6	7.1	3.1	1.5	
Contractor WYs	6.5	5.9	5.0	6.2	2.6	
Contractor						
Costs (\$000)	482	458	402	520	230	2,091
Installation Travel	0	46	160	0	0	207
Total	482	504	562	520	230	2,298

■ Conclusion

The project plans shown on the preceding pages have been developed from a detailed project planning model, described more fully in Volume II. As noted at the start of this section, these plans will require continual refinement as the Agency moves forward in implementing the ISP. The order of magnitude for the total resources required should hold, but individual projects are bound to vary, both plus and minus, from the costs shown in the model. The total estimate for

the ISP implementation, although significant, represents less than one year's spending for IRM-related activities in the Agency. It is because of — rather than despite — the Agency's shrinking budgetary resources that this project must be undertaken. The Agency's management practices have been criticized from all sides recently — the ISP Plan presents a roadmap for solving many of these problems.

■ Appendix 1: List of Participants

Steering Committee

Barbara Bennett	LEG	Michael Morfit	POL/SP
Marge Bonner	OPS/AFR/DP	Linda Morse	OPS/ASIA/EA
Larry Crandall	POL/SP	Jim Murphy	FA/PPE
Ann Dotherow	FA/OMS	Sandy Owens	FA/FM
Michael Farbman	OPS/PRE/SMIE	Wendy Stickel	POL/CDIE
Terry Liercke	FA/HRDM/SCD	Larry Tanner	OPS/FHA/PPE
Caroline McGraw	FA/B/SB	Ann Van Dusen	OPS/R&D/H
David Mein	IG/RM (<i>non-voting member</i>)	Lee Walter	XA

■ Other Participants

Randa Abbas	Bruce Loc Eckersley	Pat Kristobek	Marcus Rarick
Iman Abdel Halim	Gary Eidet	Margaret Kromhout	Steve Renz
Cecile Adams	Carolyn Eldridge	Gretchen Larrimer	Dan Riley
Cephas Agola	Stephen Elko	Gary Leinen	Bob Rosenstock
Nimo Ali	Barbara English	Amanda Levenson	Jerry Sajewski
Richard Ames	David Erbe	Raymond Lewman	Les Schoonover
Bill Anderson	John Eriksson	Linda Lion	Kenneth Sherper
Tyle Auduong	Sharlene Febrey	Larry Livesay	K.C. Shrestha
Robert Baker	Roberto Figueredo	Luke Malabad	Lorraine Simard
Marta Baltodano	Jose Flores	Jeff Malick	Roger Simmons
Carla Barbiero	Doug Franklin	Elizabeth Martella	Meg Smith
Hank Bassford	John Giusti	Andrew Mike Maxey	Mike Hayden Snyder
Jane Bise	Cathy Gleason	Roy Miller	Pat Sommers
John Blackton	Barry Goldberg	Ken Milow	David Soroko
Lee Borcik	Kathy Grazaini	George Moore	Donald Soules
Alfreda Brewer	Joe Gueron	Vicki Moore	Scott Spangler
Gerald Britan	Khem Gurung	Kathryn Morgan	Dwight Steen
Marshall Brown	Santosh Gyawali	Leticia Z. Morlacchi	Joe Sterling
Sally Bryant	Tom Hand	Michelle Morris	Larry Tanner
Jerry Burke	Timm Harris	Loubert Reese Moyers	Keith Tayloe
Sue Buzzard	Lois Hartman	David Mungai	Peggy Thome
Frank Caropreso	Joe Heffern	Mike Muterspaw	T.R. Tuladhar
Ramon Castillo-Mendez	Phil Heneghan	Sam Mwale	Michael Usnick
Carmen Castro	Bill Hobler	Steve Naas	Ray Van Raalte
Bryan Cayes	Karen Horsch	Esther Ndiang'ui	Wayne Van Vechten
Doug Clark	Robert Hudec	Gerald Nell	Bernai Velarde
Jesse Cloud	William James	Gary Nelson	George Wachtenheim
Christopher Crowley	Janet Jarquin	David Neverman	Ralph Wagner III
Bob Cunningham	Thomas Johnson	George Njoroge	Bob Weiland
Hal Daveler	Gerald Johnston	Richard Nygard	Glenn Whaley
Paul Davis	Robert Jordan	Tim O'Brien	Richard Wheldan
Ed Depukat	Mary June	Kathy O'Meara	Lee White
Kenneth Devansky	Kelly Kammerer	Jack Owens	Nimalka Wijesooriya
Richard DiCiurcio	Wanjiku Karanja	Randall Parks	Fred Will
Alan Dickerson	Jerusha Karuthiru	Carlos Pascual	Chris Woodard
Alexander Dickie	V.J. Kebis	Chuck Patalive	Len Yaeger
Jim Dry	Kim Kertson	Leonel Pizzaro	Marco Antonio Zavala
Bill Durell	Neil Kester	Stephen Polkinghorn	
Gene Dwyer	Paul Knepp	Peggy Quammen	
Paul Eavy	Kathy Kosar	Stephen Ragam	

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On Improving Management through Information Management: An Analysis of the OMB Report on "Improving Management at the Agency for International Development" and Its Implications for Agency Information Management

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