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HEALTH INFORMATION SYSTEM DEVELOPMENT N THE DOMINICAN REPUBLIC

WASH FIELD REPORT NO. 111

JANUARY 1984

Prepared for:
USAID Mission to the Dominican Republic
Orders of Technical Direction Nos. 99 and 103

WATER AND SANITATION FOR HEALTH PROJECT

COORDINATION AND INFORMATION CENTER

Operated by The CDM Associates
Sponsored by the U. S. Agency for International Development

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10 February 1984

Phillip R. Schwab
USAID Mission
Dominican Republic

Attention: Dr. Oscar Rivera

Dear Mr. Schwab:

On behalf of the WASH Project I am pleased to provide you with with 5 (five) copies of a report on "Health Information System Development in the Dominican Republic."

This is the final report by Dr. Kenneth McLeroy and Michael Connelly and is based on their trips to the Dominican Republic in June, September and October 1982, and February 1983.

This assistance is the result of requests by the Mission on May 13, 1982 and June 29, 1982. The work was undertaken by the WASH Project under Orders of Technical Direction Nos. 99 and 103, authorized by the USAID Office of Health in Washington.

If you have any questions or comments regarding the findings or recommendations contained in this report we will be happy to discuss them.

Sincerely,

for Dennis B. Warner
Director
WASH Project

cc: Mr. Victor W.R. Wehman, Jr.
S&T/H/WS

DBW:lk

The WASH Project is managed by Camp Dresser & McKee Incorporated. Principal Cooperating Institutions and subcontractors are: International Science and Technology Institute; Research Triangle Institute; University of North Carolina at Chapel Hill; Georgia Institute of Technology - Engineering Experiment Station.

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HEALTH INFORMATION SYSTEM DEVELOPMENT IN THE DOMINICAN REPUBLIC

Prepared for the
USAID Mission to the Dominican Republic under
Orders of Technical Direction No. 99 and 103

PD 485Y

Prepared by:

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and
Michael C. Connelly, M.E.

January 1984

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EXECUTIVE SUMMARY

This Field Report reviews work under two related Orders of Technical Direction for the Dominican Republic, No. 99, Health Information System Development: Microcomputer Demonstration; and No. 103, Health Information System Development: Assessment and System Design Study.

Under OTD No. 99 WASH was asked by the USAID Mission to the Dominican Republic to design and present a demonstration on how information generated by the Secretariat of Health (SESPAS) could be processed, analyzed, and displayed using a microcomputer. Approximately 6,000 SESPAS primary health care workers or promoters are currently collecting basic health and household data on 100 to 300 families each under USAID Health Sector Loan II. Methods of using this information efficiently for analytical, planning, and management purposes were being considered. The microcomputer was under consideration as a cost effective method of processing and analysis.

The scope of work for OTD 99 included meetings with Mission and SESPAS personnel to identify data characteristics, to describe the data collection system, and to determine appropriate uses of the processed data. Based on these findings, a preliminary set of file structures, record formats, and displays were established for demonstration to SESPAS and Mission officials in the Dominican Republic. The demonstration by the Research Triangle Institute team was given in September 1982 using an Apple II microcomputer. Appendices A, B, and G of this report summarize the activities in response to OTD No. 99.

As a result of the microcomputer demonstration and continued contacts and discussions between USAID Mission staff in the Dominican Republic and WASH project staff, WASH was requested to provide technical assistance in a health information system needs assessment under OTD No. 103. The objectives of the needs assessment included: (1) identifying and describing existing data collection activities; (2) identifying information requirements; (3) information system design; (4) specifications of the support system requirements; and (5) the preparation of a final report which documents the specifications and recommendations in (1) through (4) above.

The two specific areas of information system design selected for detailed analyses were inventory control and activity management. Inventory control included data on well drilling and pump installation supplies and latrine slabs. Activity management included reporting forms and procedures for monitoring the activities of well drilling teams, pump and platform installation crews, well and pump repair crews, water container distribution teams and health education. Study of the current information procedures indicated a need for reorganizing and maintaining the information being collected. This led to the specification of information system requirements and the identification of resources needed for effective file maintenance, monitoring, and coordination.

The report concludes with four recommendations:

1. Implementation of a manual index card file system for inventory control and for activity management.

2. Close monitoring of the progress of utilization of the manual system, documenting all problems that arise, and evaluating the system on a quarterly basis for the first year of operation.

3. After one year of successful manual operation, computerization of the central system should be considered for implementation on a microcomputer-based hardware configuration centrally located in Santo Domingo. Field procedures established under the card system would remain manual. Technical assistance should be obtained for initial system design, implementation, and training.

4. A computer-based system should include other office functions to the extent possible. Word processing and financial spreadsheet analysis have proven extremely cost effective on microcomputers and should be integrated into the system when the machine is not in use for information system activities.

Chapter 1

INTRODUCTION

Since its inception in 1980, the USAID-funded Water and Sanitation for Health Project (WASH) has provided technical assistance and consultation to the USAID Mission in the Dominican Republic on the implementation, management, and evaluation of the USAID Health Sector Loan II. Areas of technical assistance have included: (1) design of an outcome evaluation; (2) a scope of work for the outcome evaluation; (3) quality control for the manufacturing and assembly of handpump components; (4) preparation of latrine top and water container specifications; (5) the siting of wells; and (6) a demonstration of the utility of microcomputers for data management. A report on the microcomputer demonstration is included as Appendix A.

Partly as a result of the microcomputer demonstration and continued contacts and discussions between USAID Mission staff in the Dominican Republic and WASH project staff, WASH was requested to provide technical assistance in an information system needs assessment. The specific objectives of the needs assessment included: (1) identifying and describing existing data collection activities; (2) identifying information requirements; (3) information system design; (4) specifications of the support system requirements; and (5) the preparation of a final report which documents the specifications and recommendations in (1)-(4).

In order to accomplish these objectives, two trips were made to the Dominican Republic: the first trip occurred October 24-29, 1982; and the second on February 21-26, 1983. The first trip focused on objective 1 above--identifying and describing existing data collection activities--while the second trip focused on objectives 2-4 above. The purpose of this report is to present the results of the information system needs assessment for monitoring Health Sector Loan II. Chapter 2 discusses the Health Sector Loan II. Chapter 3 describes the current data collection activities; Chapter 4 presents the information systems requirements; Chapter 5 presents the resource requirements for both a manual and computerized management information system; while Chapter 6 provides a summary of the information system recommendations.

Chapter 2

PROJECT BACKGROUND

The HSL II project continues the rural health improvement efforts that were begun under the HSL I project in 1975. The goals of the HSL I project, as stated in the project paper, were to reduce infant and pre-school mortality by 15 percent in 3 years and to reduce the crude birth rate by 15 percent in 5 years. The goals were to be met by improving the delivery of health services in rural communities with populations between 400 and 2,000 people through a Basic Health Services (Servicio Basico de Salud, SBS) program. The HSL I project, through the SBS program, operates in the country's six health regions. Before this project, a limited number of rural clinics and hospitals offered health services, but they were underutilized, in part due to their poor quality.

The HSL I SBS program trained auxiliary health workers, called promoters, who are residents of the communities where they work. Each promoter is charged with visiting the assigned families (usually 70 to 80 families per promoter) twice a month to record vital statistics (births, deaths, and migrations), immunize children against diptheria, pertussis, tetanus, polio and measles and provide basic orientations needed by the families in health, nutrition, and family planning.

During their home visits, the promoters distribute aspirin, cough medicine, antidiarrhetics, condoms and contraceptive pills as needed. They advise the family on the preparation and utilization of oral rehydration fluids, make referrals for IUD insertion and female sterilization and, if necessary, refer patients to the nearest clinic or hospital. In addition to recording vital statistics, they record the weight, height, and at times, arm circumference of all children under 5 years old. The arm circumference measurements are now becoming a regular procedure for the promoters.

The promoter reports to a supervisor, who manages ten promoters, and the supervisor reports to a supervising manager who is in charge of 20 supervisors. The SBS program is administered by the State Secretariat for Public Health and Social Assistance (Secretaria de Estado de Salud Publica Y Asistencia Social, SESPAS) of the GODR. To date about 5,350 promoters have been trained and are working in about 5,000 communities in the six health regions throughout the country. Each promoter was selected by a health committee formed by and composed of community residents. The committee is charged with reporting to the supervisors on the work of the promoters. The promoters were trained for 3 weeks in the basic service which they provide, and for an additional week in nutrition.

The HSL II project will extend the work of the SBS program into additional communities to reach another 200,000 people and to provide three health-related interventions to 500 rural communities with populations between 400 and 2,000 people. The project is to operate in three of the country's six health regions. The three interventions include: (1) potable water systems; (2) sanitary latrines, i.e., pit privies; and (3) health education.

2.1 Water Supply Program

The potable water systems are being installed by mobile well drilling and installation teams managed either under contract to or managed directly by SESPAS. The sanitary latrines will be constructed by local villagers with supplies provided by SESPAS. The health education program will be established by SESPAS with support from the village level health promoters. These three interventions are described in further detail in the following sections.

Two types of potable water systems are being implemented as part of the HSL II project. The first system includes drilled wells with public handpumps; while the second system consists of gravity-fed supply (from capped springs) and public fountains.

The handpump system consists of an AID pump assembly mounted on top of a concrete apron. The pump uses a lever arm and fulcrum to move a piston rod up and down in suctioning water into the pump chamber. The gravity-fed system consists of a mountain spring which is capped and from which water is conducted to a tank down slope which serves as a storage and settling tank as well as a pressure equalization tank. From the storage tank, the water descends the hill and is distributed to smaller pipes in public fountains located throughout the villages served by the system. One well or one faucet is to be provided for every ten houses.

Maintenance of the pumps and fountains and replacement of worn and broken parts is the responsibility of the health committee in each village. In order to fulfill this responsibility, the village committee collects 50 centavos (equivalent to $.50 US) from each family per month until 60 pesos have been collected to establish a fund to be used to purchase parts and materials. The committee also appoints a volunteer to be trained by a program maintenance crew.

In addition to providing a convenient source of potable water, the project also intends to provide each home with a 20-gallon covered plastic container with a faucet so that water can be stored in the homes in a sanitary manner. To transport the water from the source to the home, 5-gallon plastic containers with handles will be provided to each home.

2.2 Excreta Disposal (Latrine) Program

The excreta disposal program consists of constructing pit privies (latrines) at each house in the village to be served by the program. The project envisions the installation of 22,500 privies.

The privy system consists of a hold dug in the ground about one meter square and 1.8 meters deep. The hole is covered by a concrete slab, and a molded concrete stool with a wooden cover is set over a hole in the slab. When the slab is installed, an above ground shelter is placed over the latrine.

2.3 Health Education Program

The health education component of the HSL II project is designed to maximize the health benefits to the community of the water and sanitation programs through educating rural communities in health-related aspects of the project. In order that an individual realize the health benefits of the project, he or she must have: (1) access to the water and latrines which are provided by the program; (2) information as to how to use these components most effectively; and (3) the motivation and organizational support to do so.

The health education component will provide the latter two elements to the individual and the community through the infrastructure of the health committee, the promoter, and the promoter's supervisor. A three-day workshop will be hld in one of the communities for groups of five communities. The promoter and five members of the health committee, or other community members appointed by the committee, will attend the workshop.

The content of the workshop will center around technical information, methodology of transferring this information to the community, and methods of organizing, supporting, and motivating the individuals in the community to act on the information.

After the 3-day workshop, a series of continuing 1-day workshops will be held for groups of ten communities every 3 months. The purpose of these 1-day meetings will be for supplementary training, problem solving in the water supply and sanitation program, and presentation of information on other health problems in the community, especially family planning and nutrition.

The health education program will be conducted by the Technical Field Operations Unit (UTOC) of SESPAS.

2.4 Other Aspects of the Project

The SBS program will also be expanded to cover 100 communities already served by rural clinics, and the 100 rural clinics and 20 small hospitals will be upgraded so that patients referred to them can receive adequate care.

Chapter 3

DESCRIPTION OF EXISTING DATA COLLECTION ACTIVITIES

There are several basic categories of information currently being collected as part of the management and evaluation of Health Sector Loan II. These include the following:

A. Health-Related Activity and Status Forms
   1. Health Promoter Bibliographic Forms
   2. Ficha Familiares
   3. Monthly Activity Forms
   4. Summary Forms by Supervisors
   5. Annual Registration of Midwives
   6. Community Health Committee Reports
B. Financial Reports and Accounting Systems
C. Management and Monitoring Activities
   1. Inventory Controls - Receipts and Disbursements
   2. Activity Reports
      a. Well Drilling Team Reports
      b. Pump and Platform Installation Reports
      c. Latrine Installation Reports
      d. Water Container Distribution Reports
      e. Well and Pump Repair Crew Reports
      f. Health Education Activity Reports

Since the decision was made by U.S.A.I.D. Mission Staff to focus the information system needs assessment on management and monitoring activities for the Health Sector Loan II, A and B above will not be discussed. However, Appendix B contains a description of the health-related activity and status forms.

This chapter, then, will describe the existing procedures and forms that are being used to manage and control the activities of Health Sector Loan II. These include both inventory controls and activity management.

3.1 Inventory Control: Receipts and Disbursements

There are two categories of inventory which are separately managed as part of Health Sector Loan II: (1) well-drilling and pump-installation supplies; and (2) latrine slabs. These are discussed below.

3.1.1 Well-Drilling and Pump Installation Supplies

SESPAS staff have recently revised the forms and procedures for receiving and disbursing equipment from the supply depots. Until recently, all supplies were dispatched to the well drilling crews from a single inventory site in Azua. Currently, there are six inventory sites in operation, and forms and procedures have been revised to improve accountability.

In order to receive supplies from the depot(s), each well drilling or pump installation team must first submit a Materials Request Form. This form

includes information on the types and quantity of materials requested and received by each team, as well as the communities where the materials are to be used. In addition, a separate form is completed on unused supplies which are returned to the depot(s).

Each supply depot maintains copies of the Materials Request Form, as well as an up-to-date inventory of supplies on hand. The Supply Inventory Form lists all transactions (i.e., receipts and disbursements) for each type of material and a balance column for supplies on hand. Finally, each depot completes a Receipt Form for all new materials received. Copies of each form are maintained at the depot(s) with additional copies of each form being sent to: (1) the central office in Santo Domingo; and (2) the well drilling or pump installation teams.

At the central office in Santo Domingo, a file is maintained of all receipts, disbursements, and supplies on hand. However, the current filing system in the central office does not include a separate file for each supply depot. Therefore, the central office inventory listing cannot easily be cross-checked against the inventory listing in each site.

Copies of the inventory control forms are included in Appendix C.

3.1.2. Latrine Slabs (Tops)

Unlike well and pump supplies, latrine slabs are currently stored at regional hospitals as they are produced and manufactured. Since no one at the regional hospital sites is designated to be responsible for maintaining latrine slab inventories--including receipts and disbursements--an accurate inventory is not available. However, procedures have recently beeen introduced to establish greater inventory control over latrine slab production, distribution, and installation.

Current plans call for the designation of a single individual at each of the regional hospitals to be responsible for latrine slab inventory--similar to the supply depots--of latrine slabs delivered, latrine slabs dispatched, and the balance of latrine slabs on hand. However, with the exceptions of visits to communities by SESPAS engineers or health education workers, no system currently exists for assuring that latrine slabs are delivered to the appropriate communities, or for maintaining inventory control within each community.

A copy of a latrine slab order form is included in Appendix C.

3.2 Activity Reports

In addition to establishing forms and procedures for inventory control, SESPAS has recently introduced activity reporting forms and procedures to monitor the activities of: (1) the well drilling teams; (2) pump and platform installation crews; (3) well and pump repair crews; (4) water container distribution; and (5) health education activities. Each of these activities is briefly discussed below.

3.2.1 Well-Drilling Teams

Prior to the most recent visit to the Dominican Republic on February 21-26, 1983, well drilling was being performed by private crews under contract to SESPAS. The private well-drilling crews were required to submit monthly activity reports which indicated the number of feet drilled and the amount of supplies and equipment used during the month. The activities of the well-drilling crews were supervised by SESPAS engineers, with reimbursement based on the number of feet drilled (and the other dimensions of the wells) during the time period. However, the reports which served as the basis of reimbursement were not linked to specific wells, but rather were summaries of activities across wells. The use of equipment and supplies was not directly cross-checked against supplies drawn from inventory, supplies used during the time period, and supplies on hand. A copy of the well drilling crew reporting form is included in Appendix D.

Current plans call for the wells to be drilled by engineers and well drilling crews employed by UAPODAN. It was unclear at the time of the February visit what reporting forms would be used by the UAPODAN crews.

3.2.2 Pump and Platform Installation Activities

The pump and platform installation crews must submit a reporting form for each pump or platform installed. The reporting form contains information on: (1) the date of installation; (2) the community served by the pump or well; (3) the location and depth of the well; and (4) the supplied utilized. A copy of the pump installation form is included in Appendix D.

3.2.3 Latrine Top Installation Reports

With the reorganization of the health education component of Health Sector Loan II (within SESPAS), the health education component has assumed a more active role in: (1) establishing the village health committees; (2) working with the village health committees and health promoters in latrine installation; and (3) working with the village health committees in establishing mechanisms for collecting village contributions to be used for pump and well repair. Temporarily, the health education component staff are coordinating their village level activities with the well-drilling crews, by identifying villages where wells are being drilled and assigning village development activities to specific health educators. During this stage of the project, the health educators are working with specific villages for a limited period of time--until latrines are installed, and water containers distributed. As the pump, latrine, and well installation phases of the project are completed, the health educators may assume longer term community health education responsibilities by being phased into the ongoing rural health activities of SESPAS.

Currently, the health educators are responsible for completing the latrine installation forms for each community they service. A copy of the latrine installation form is included in Appendix D.

3.2.4 Water Container Distribution Forms

Once the wells have been drilled, the pumps and platforms installed, and 80 percent of the households in a community have installed latrines, then the households with latrines are eligible to receive 20-gallon water containers. These water containers are sealed, and are to be used for storing potable water in the households. The health education workers are responsible for identifying communities and families eligible to receive water containers, distributing the containers, and for identifying communities and individuals which have received water containers. The 20-gallon water container distribution form is included in Appendix D.

3.2.5 Well and Pump Repair Crew Reports

Until recently, there has been a lack of coordinated effort to identify pumps and wells out of service, and to repair broken or damaged pumps and platforms. Currently, well and pump repair crews are being recruited, and procedures established for identifying well and pumps out of service, and for scheduling repairs. Copies of the pump and platform repair reports are included in Appendix D.

Several alternative procedures for identifying wells or pumps out of service are being considered: (1) relying on notices from the community health committees; (2) using the existing health promoter reporting system; and (3) relying on the periodic visits by engineering or health education staff. Each of these alternatives are briefly described below.

As part of the recent revision to the health promoter data collection activities, community health committees in one of the six regions are requested to provide information on a monthly basis to the Rural Health Office within SESPAS. The monthly reporting form contains information on wells, pumps, latrines, and garbage disposal in the community. While the form contains information on pumps and wells out of service, the delivery of the form relies on regular mail service between the communities and Santo Domingo. Thus, the receipt of the forms in Santo Domingo is uncertain, and may require more than 3 months. A copy of the Community Health Committee reporting form is included in Appendix E.

A second alternative for information on pumps and wells out of service is to rely on the reporting system used by the health promoters. As noted in Appendix B, the health promoters in each community must submit monthly natality and mortality reports to their supervisors. The supervisors, then, summrize the information and pass it on to the next level of supervisor. As with the monthly reports to be completed by the village health committees, reliance on the health promoter information system could result in delays of over 2 months before notification of a pump out of service is received in Santo Domingo.

A third alternative source of well and pump information is to rely on periodic visits by health education workers and SESPAS engineers. While this may be a feasible alternative in the future, visits are not regularly scheduled to all villages served by Health Sector Loan II. Thus, notification of pumps and wells out-of-service is as uncertain as the other two alternatives.

A more feasible alternative to the three discussed above would be to have a single individual within each region designated as responsible for receiving and maintaining information on pumps and wells out-of-service. The information would be collected from each region one to two times per month by SESPAS engineers and either: (1) delivered to Santo Domingo if the repair function is to be centralized; or (2) delivered to regional repair crews if the repair function is to be regionalized. In either case, the health committee in each of the communities would be responsible for hand delivering notices of pumps and wells out of service to the regional individuals responsible. Monthly fees being collected by the health committees for well and pump maintenance could be used to defray travel expenses.

3.2.6 Health Education Activities

Since the health education component of Health Sector Loan II has been recently reorganized and restructured, most of the health education activities have been focused on organizing village health committees, and implementing the latrine program. As a result, the development and implementation of other health education activities has been limited. Copies of the health education activities reporting form is included in Appendix F.

3.2.7. Summary

With the exception of health education activities, and information on pumps and wells out of service, data are currently being collected as part of Health Sector Loan II which would allow for adequate monitoring of the loan activities. As discussed in the following section, what is currently missing in the existing information system is a process of organizing and maintaining the information being collected in such a way as to maximize its utility.

Chapter 4

INFORMATION SYSTEM REQUIREMENTS

As discussed in Chapter 3, the decision was made by U.S.A.I.D. Mission staff to focus the information system needs assessment on management and monitoring activities of the Health Sector Loan II. These include (1) inventory control; (2) monitoring and management of project activities at the village level; (3) assuring that related activities are coordinated and supervised. Before presenting the resource requirements for the modified system (Chapter 5), this section will present the objectives of the information system in terms of the file structures that are needed at the central office in Santo Domingo. The presentation in this section is in terms of the information system objectives as they would be implemented on a manual index card system.

4.1 File Structures for Inventory Control

As noted above, inventory control systems for the health sector loan must account for eqipment and supplies at both the point of use and in the supply depots. In order to accomplish these two objectives, two accounting systems are needed in the central office in Santo Domingo: (1) an accounting system for each of the supply depots; and (2) an accounting system for each of the well drilling crews. These are discussed separately below.

4.1.1 Supply Depot Accounting Systems

In order to maintain an accurate count of receipts, disbursements, and stock on hand of supplies and equipment, a record keeping system should be established for each supply depot in operation. The record system should contain the following information on each piece of equipment or supplies:

- Date of transaction
- Quantity
- Type of transaction (receipt or disbursement)
- Recipient or provider
- Depot personnel handling the transaction
- Balance on hand.

For example, if on June 3, 1983, the central office received a notice of receipt at the supply depot of 600 feet of 3" metal pipe from a specific supplier, the entry for this transaction would contain the date of receipt at the depot rather than a disbursement, the name of the supplier of the pipe, the name of the person at the depot responsible for receiving the pipe and comparing the quantity received with the invoiced amount, the amount of pipe received, and the balance of 3" pipe on hand.

This type of inventory record keeping system is similar to a bank book account in that it maintains a running tally of all pieces of equipment. Such a system can be set up either as a card file or as a paper file. If established as a card file, there would be a separate file for each supply depot, and one card for each type of equipment or supplies. The cards would be maintained by a single individual on a continuous basis, as

notices are received by the central office of transactions that occur at each depot. Thus, the index cards to be used in the system could be printed in the following layout.

Date	Receipts	Disbursements	Supplier/ Recipient	Supply Depot Personnel	Balance on Hand

Under the receipts or disbursements column would be entered the amount of the supplies received or disbursed. Each transaction for a piece of equipment would occupy one line on the card.

A similar file should be established and maintained at each of the supply depots. At least four times a year, the master file at the central office in Santo Domingo should be cross-checked with the file at each of the inventory sites and discrepancies investigated and corrected. Additionally, the inventory at each depot should be counted at least four times a year and cross-checked against the inventory files.

This type of inventory system could be easily adapted to the maintenance of latrine slab inventories. There would be a single card in the central office in Santo Domingo for each site where latrine slabs are stored, with all transactions (receipts and disbursements) recorded on that card. In addition, a single individual at each site where latrine slabs are stored would be designated as responsible for receipts and disbursements.

Unlike the supply depots for well drilling supplies, latrine slabs are sometimes disbursed to the villages weeks or months befor the latrines are dug and the slabs installed. Therefore, unless the latrine slab delivery system is modified in order to deliver latrine slabs more closely to the date of use, it is important that accountability for latrine slabs at the village level be established. That is, if latrine slabs are to continue to be delivered some time before they are to be installed, the village health committee or some individual in the village must be responsible for maintaining the inventory. More importantly, a system must be established to maintain in the central office in Santo Domingo an accurate accounting of the number and location of latrine slabs. Recommendations for such a system are discussed in Section 4.2.

4.1.2 Accounting System for the Well-Drilling Crews

In addition to establishing an accounting system for each of the supply depots as described above (4.1.a), it is essential that supplies and equipment be accounted for at the point of use. That is, a record keeping system is needed which would allow the project manager to balance the equipment received by each of the well-drilling crews against the supplies used for each well in a time period and the equipment still on hand. This is based on the assumption that the sum of the equipment used for each well and the supplies still on hand in a given time period should equal the supplies drawn from the supply depots.

The first two forms in Appendix D provide copies of the forms used by the well-drilling and pump-installation crews to report on monthly activities to the project manager. However, the first form (for the well-drilling crews) is not submitted on a well-by-well basis, but summarizes well-drilling activities on a montly basis for purposes of reimbursement. Since SESPAS engineers are responsible for verifying well-drilling activities and dimensions on a well-by-well basis, it is essential for purposes of inventory control that these forms be completed individually for each well.

At the central office in Santo Domingo, a file should be established for each well-drilling crew which contains copies of: (1) disbursements to each well-drilling crew from each of the supply depots; (2) monthly well-drilling activity reports, by well, which list the equipment and supplies used. This information will allow the project manager to periodically visit the well-drilling crews, count the materials on hand, and balance the disbursements from the supply depot with the supplies on hand and the materials used in previous wells during the time period. The well-drilling crew boss should be held personally responsible for any shortages detected during a time period. Obviously, the equipment on hand when the system is implemented must be accounted for during the first time period check.

This accounting system for the well-drilling crews, then, will link materials used to specific wells and well drilling crews. Secondarily, it will allow the project manager an indirect measure of the productivity of each of the well drilling crews, since activities and accomplishments can be directly compared across crews. It is important to note, however, that an essential component of the system is the periodic checking of the dimensions of each well by SESPAS engineers, since shortages of supplies could be accounted for by overreporting the dimensions of wells.

4.2 Montoring Activities at the Village Level

In addition to establishing an inventory control system for the supply depots, latrine slabs, and well-drilling crews, it is esential that a formal system be established for monitoring project activities at the village level. A simple system which is feasible to establish within the personnel and resource limitations of the project manager is based on an index card system. An index card file would be established which contains basic information on each village being served by Health Sector Loan II. For each village, a series of index cards would be completed which contain at least the following information:

CARD 1 Village Card A
- Village Name
- Village Location: Region, Municipality, Province, Paraje
- Number of Families
- Number of Residents
- Number of Houses
- Health Committee Established (Date)
- Members of Village Health Committee (Names)

CARD 2 Village Card B

	Date	Number	Percent
Number of Houses Contributing to the Water Fund			
Total Monies Received During the Month			
Total Amount Spent During the Month			
Total Amount of Funds on Hand			

CARD 3 Latrine Card

Number of Latrine Slabs Delivered (Date)
Number of Latrines Installed
Percent of Houses with Latrines

CARD 4 Well(s) and Pump(s) Card (one for each well)

Date Unit Installed
Well Dimensions
Type of Material Used
Type of Pump

Well Out of Service	Date Reported	Date Repaired	Problems
Pump Out of Service	Date Reported	Date Repaired	Problems

CARD 5 Water Container Card

Number and Date of Water Container Delivery

CARD 6 Health Education Activities

Activity Description	Date

This system is based on a transaction approach, with a transaction being defined as any project service or contact that occurs at the village level. As information comes into the central office of activities at the village level, the data would be recorded on the appropriate index card. More specifically, cards A and B would be initially filled out using information already provided by the SESAS engineers, health promoters, and health education personnel. The information would be periodically updated using the monthly form filled out by the village health committee (Appendix E) and periodically validated through visits by health education staff.

The latrine card would be initially filled out using the latrine slab reporting system (on slabs delivered) and updated using the monthly information provided by the village health committee (Appendix E) as well as the installation of latrines reporting form (Appendix F) used by the health education staff.

The well and pump card (one for each well and pump) would be filled out using information provided by the well drilling and pump installation crews (Appendix D). Information on pumps or wells out of service would be completed using the alternative sources described in Section 3.2.e.

Finally, cards 5 and 6 would be completed and updated using information provided by the health education staff (Appendix F).

This card file system, then, will provide an ongoing record system of project-related activities that occur at the village level. Forms and reports that are used to create and update the village level card files can also be filed by type of activity and time period, which makes information readily accessible for producing periodic project reports. By using colored metal index tabs, the village card file can also be clipped to the appropriate card within each village to indicate transactions that are needed. For example, a red metal tab could be clipped to the well or pump card to indicate a well or pump out of service and needing repairs. A yellow tab on the water container card would indicate that a village had met the criteria for water containers and that containers need to be shipped. Additionally, the tab system can be used to indicate overdue reports. For example, tabs can be used to indicate which villages had not submitted their monthly summary report (Appendix E).

Finally, the village level file could be used with a map of the service area to identify and schedule village visits for pump or well repairs.

More importantly, the village level file will provide a longitudinal summary and accounting of project activities for an end of project review. However, as discussed in Section 5, the operation and maintenance of such a system requires that a single individual be designated to maintain and operate the information system, and a clear delineation of project reporting requirements.

4.3 Coordinating Related Activities

As described in Chapter 2, there are currently two lines of authority under the overall project director: (1) engineering operations; and (2) health education. Since the successful completion of the project requires the coordination of the related engineering and health education activities, it is essential that coordination mechanisms be established. At the time of the last visit to Santo Domingo, the director of engineering operations and the director of health education were meeting on a weekly basis to coordinate activities. In order to facilitate coordination, it is suggested that copies of activity reports be exchanged on a weekly basis between engineering and health education operations. Additionally, it is suggested that monthly working plans be exchanged between the two operations, which can then be updated weekly. These weekly meetings, then, will include exchanges of informaiton on activities to date, as well as updates on future plans. This should help to clarify the specific role responsibilities of each of the operations.

Chapter 5

RESOURCE REQUIREMENTS OF AN INFORMATION SYSTEM

5.1 Design and Development Considerations

A properly designed and implemented information system, manual or computerized, provides the ability to access, update, and report information in a timely, efficient and effective manner according to the needs of the user. To provide this capability, however, the design and development of an information system must successfully address the following considerations:

1) An accurate appraisal of the needs of the user must be performed to (a) determine the scope and feasibility of the system, (b) help the user define the "true" informational requirements, and (c) identify a set of reasonable expectations for the user. Far too many "information systems" have faltered due to the lack of clear and reasonable goals and objectives.

2) An integral component of a needs assessment is the identification of the data elements to be contained in the system. Each data element must be defined by type, application, and source. In this manner, data collection and maintenance costs can be easily weighed against the usefulness of the data in the system.

3) Once the data elements have been defined, a means for managing the information must be designed. Information systems can range from simple manual procedures to complex computerized database management systems. The underlying criteria, however, are that the process must be sufficient and efficient in meeting the needs of the user. The efficient delivery of information requires that the system be structured to minimize the collection and aggregation of data. As such, filing and cross-referencing methods utilized must optimize the type, amount, and format of data to be reported and perform these functions in an efficient manner. Data redundancy and duplication must be minimized to levels necessary only to maintain data integrity and verification. The data must be accessible and capable of being reported in a format directly applicable to the needs of the user. Filing and cross-referencing functions must adequately fulfill these needs in a cost-effective manner.

4) A properly designed information system must be responsible to the changing needs of the user. It must be able to provide the user a means of accessing, manipulating and extracting information based upon widely divergent criteria. Its design must also be sufficiently flexible to provide the developer a means for system changes ranging from simple report modification of data element additions to global restructuring of the data files.

These four issues are all integral components of the needs assessment performed and, as such, have been presented in concept in the first four chapters of this report.

5.2 Administrative and Personnel Considerations

Prior to carrying forth the implementation of an information system, however, an evaluation of anticipated administrative and organizational support as well as staff responsibilities and assignments must be performed in order to realistically assess the true potential for successful implementation. As such, the following two additional administrative concerns must be addressed:

5) To deliver timely information, the system must be able to maintain complete, current, and accurate data. This requires a sufficient organizational support structure to efficiently collect and process the data necessary for entry to the system. If certain data cannot be consistently and accurately captured within the system, then they should be eliminated or surrogate measures found. In addition, organizational support is needed to provide the critical feedback necessary to continually assess the extent to which the user's needs are met.

6) The successful use of an information system highly depends upon the expertise and competency of those charged with the responsibility for the system. Collection and point-of-entry responsibilities must be defined and enforced. Training must focus both on the technical aspects of information management and data processing, as well as on the substantive aspects of information application and analysis. An information system can only facilitate staff planning, evaluation, and reporting functions. It cannot replace them. A higher degree of reliability will generally be achieved if the staff assigned to manage the information system understand the value of the information.

For purposes of the Health Sector Loan information system presented in Chapter 4, these two issues can be translated into specific requirements to be placed upon the administrative management of the Health Sector Loans. These are:

- The collection, processing, and maintenance of the information system data elements (as defined in Chapter 4) must be supported by active utilization of the data reported as an integral component of program management, planning and evaluation. This includes a set of defined actions to be taken as a result of information reported through the system (e.g., reports to villages for confirmation of activities and transactions, specific actions taken on "missing" or unbalanced inventory).

- Competent and trustworthy staff must be assigned the system responsibilities at each link in the system. Incentives and disincentives should be made clear and enforced. Adequate time should be allocated by staff to management of the system. In all cases, staff should be made aware of the value of the information collected and, where possible, incorporate such staff in the planning process.

- An individual should be named "Information Systems Manager" with a full-time commitment to management of the Health Sector Loan information system. Located in Santo Domingo and reporting directly to Dr. Herrerra, this individual will be responsible for maintenance of all central files and generation of all reports. This individual should be provided sufficient authority to take action based upon findings in the information system. Actions can range from field site visits for clarification of data to the initiation of personnel problem resolution.

In summary, a well-designed and implemented information system may still be severely constrained when insufficient administrative and personnel resources are assigned to support the system. Given the geographic distribution of the information system data sources in the Dominican Republic, these issues may be of critical concern in that any system implemented will only be as successful as its weakest link.

5.3 Considerations of a Manual vs. Computerized System

A computerized management information system offers five primary advantages over the manual index card approach as presented in Chapter 4.

Mathematical Manipulations - The computer will perform all mathematical manipulations instantaneously and as accurately as the input data will allow. This would result in the automatic processing of: (1) inventory balances by type and location, (2) well-drilling-crew summations, and (3) village-level summations.

Report Generation - Predefined reporting requirements can be automatically generated on a periodic or as-needed basis with little or no staff preparation time. All reports are defined in terms of format, content and/or schedule only once. Actual report generation will produce high quality output with an associated level of user confidence directly proportional to the accuracy of data entry.

Data Integrity - The data entry components of most computerized management information systems provide for the use of edit checks on all data input. Range checks, value checks, and table lookups all help to improve the accuracy of the data maintained. In systems where data accuracy is essential (e.g., financial systems), double keying and comparison verification is performed. Computers also improve the integrity of the data over manual procedures through the elimination of multiple filing and transcribing of figures, thus reducing the probability of error.

Filing and Cross-Referencing - The use of a well-designed computerized management information system alleviates the burden of cross-referencing and/or multiple filing of single transactions. For example, the transfer of 600 feet of 3-inch pipe from a supply depot to a well-drilling crew requires entry only once to the system. This single entry will automatically update the inventory balances of both the supply depot and the well-drilling crew. More importantly, this entry will also show up in all summary reports drawing upon such information. The equivalent manual system would minimally require entry and/or cross-referencing in both the supply depot and well-drilling crew files as well as requiring manual aggregations of the data for reporting purposes.

Flexibility in Use - Employment of a computer can greatly assist in answering spontaneous questions and reporting needs. Such a system provides a high degree of flexibility in sorting, searching and cross tabulating data contained in the system. Typical requests can range from examining the records of a specific well-drilling crew during October to a correlation analysis of the amount of materials used by depth of well for all wells drilled in the last year. Such tasks performed manually are tedious, error-prone, and often too time consuming to be effective.

These five advantages, however, are not offered without an equivalent set of concerns. The resource requirements of a computerized system are generally more technical in nature than those required of a manual system. The technical resources needed increase significantly the degree of expertise and competency required of those responsible for its design, development, implementation, and operation. In addition, the proper design of a computerized system may differ significantly from a manual approach.

Fortunately, the advent of the microcomputer and it's wealth of "user friendly" software has greatly alleviated the burden only associated with the computerization of an information system. What once required a highly controlled computer environment staffed by a battery of computer operators, programmers and analysts can now be operated from a single work station staffed by one or two individuals with the competency, aptitude, and interest to make full use of the capabilities available.

Even with the availability of proper staff, certain resources are required to insure the successful operation of such a system. These include:

- System design and development can fully utilize available commercial software packages. However, proper application of such software to the specific needs of the Health Sector Loan program should be based on a strong understanding of how to construct and implement the necessary data structures in an efficient fashion to optimize system operation.

- Availability of local microcomputer hardware and support must be considered if continuous system operation is of primary importance. While these systems have a high degree of reliability, they can and do break down. Continuous power supply must also be considered. Given the nature of electrical surges and power outages in Santo Domingo, the use of surge protectors and battery backup facilities are highly recommended.

- While staff can be "self educated" in the use and application of such a system, there are many low-cost training programs available that would greatly improve the efficiency and competency of staff. Such programs should be investigated and utilized where possible. Until staff become well versed in the use of the computer system, far more time will be spent "learning to use the computer" than on specific information system issues.

5.4 Microcomputer Selection Considerations

The issues of microcomputer system selection and configuration are decisions not to be addressed lightly. There are far too many hardware, software and peripheral options available to be able to fully evaluate and select the "best" configuration for the given application environment. As such, the typical selection criteria can range from the results of costly and time consuming investigations to recommendations from the local retail computer salesman. Unfortunately, the results of any time consuming investigation will most probably be out of date before it is completed. On the other hand, the local computer dealer's "insight" is typically limited to the merchandise he is selling.

Ideally, the decision to puchase a microcomputer and related software and peripherals should be based upon two primary issues: (1) proven success in a similar environment and application, and (2) accessible technical hardware and applications support.

Appendix G describes the basic components of any microcomputer system and discusses the issues pertinent to establishing a set of system requirements. Given the extensive work RTI is currently performing, involving a wide array of microcomputer hardware configurations and applications, the following observations are made if and when the use of microcomputers are considered.

1) Microcomputers utilizing the Intl 8088 or 8086 16-bit processor and running Microsoft's MS-DOS or Digital Research's CP/M-86 operating system are currently the "best" supported in the business industry.

2) The predominate factor in selecting a system configuration to support an information system is the software selected. Rarely should program development (writing software programs from scratch) be considered. There are a number of excellent commercial software packages available that can be applied to perform the necessary functions in a "user friendly" environment. A few of the more popular database management system packages capable of supporting the Health Sector Loan system include dBASE II (good package/well supported), Condor (similar to dBASE but not as well supported), MDBS III (excellent package, expensive and generally requires programmer support), and a new one called Knowledge Man (very good design, from the makers of MDBS). All will require some technical competency and a knowledge of database structures to properly implement the system.

3) Memory requirements are not critical. Typically 128K will be sufficient although additional memory can be utilized by spreadsheet software or applied for buffering data (print spooling and/or 'ram drives').

4) The amount and speed of mass storage is critical for database applications. It is highly recommended that a Winchester hard disk with a minimum of 10 Megabytes be utilized in the configuration in addition to at least one floppy disk drive.

5) Monitor color and resolution should be a serious concern if the system will be in use by one individual for more than a few hours at a time. Color monitors are good for presentations and graphics but typically have poor resolution for text processing applications. Amber on black or green on black are the preferred monochrome monitors. Check character formation for crisp, clear screen presentation.

6) While letter quality printers prepared the nicest reports, these printers are slow, expensive, and have little or no graphics capabilities. The newer dot matrix printers are fast and many have "correspondence" mode that produces acceptable report output.

All of these functions and components are available from a wide number of different vendors. The leader in this part of the industry is probably the IBM Personal Computer and it is certainly the most popular and best supported. Given that any number of vendors can meet the requirements of the required system, the final selection should be heavily based upon available local support, service and vendor reputation.

Chapter 6

SUMMARY AND CONCLUSIONS

This report clearly documents the need for better management of information associated with the Health Sector Loan program. The difficulties inherent in accomplishing this objective include the ability to successfully collect, process, and utilize the data elements identified. As such, the following recommendations are made:

1) Implement a manual index card-based system as described in Chapter 4 of this report. Staffing will be critical and should follow the recommendations presented in Chapter 4. If properly implemented, this system will determine the user's ability to collect the information necessary to support the designed functions.

2) Closely monitor the progress of system utilization. Document all problems that arise and evaluate the system on a quarterly basis for the first year of operation.

3) After one year of successful manual operation, computerization of the central system should be considered for implementation on a microcomputer-based hardware configuration centrally located in Santo Domingo. Manual field procedures established under the manual card system would still be performed. Technical assistance should be obtained for initial assistance in system design and implementation. This effort should be minimal (3 to 6 person weeks) and focus on working with the "Information Systems Manager" to insure a smooth transition from manual- to computer-based operation. Training should be provided.

4) Use of a computer-based system should attempt to integrate office automation capabilities to the extent possible. Word processing and financial spreadsheet analysis applications have proven extremely cost effective on microcomputers and should be integrated when the machine is not in use for information system activities.

APPENDIX A

Report on Microcomputer Demonstration Under Order of Technical Direction No. 99

DOMINICAN REPUBLIC MICROCOMPUTER DEMONSTRATION

TABLE OF CONTENTS

Chapter 1

INTRODUCTION

1.1 Background

Since its inception in 1980, the USAID-funded Water and Sanitation for Health Project (WASH) has provided technical assistance and consultation to the USAID Mission in the Dominican Republic on the implementation, management, and evaluation of the USAID Health Sector Loan II. Areas of technical assistance have included: (1) design of an outcome evaluation; (2) a scope of work for the outcome evaluation; (3) quality control for the manufacturing and assembly of handpump components; (4) preparation of latrine top and water container specifications; and (5) the siting of wells.

Partly as a result of continued contacts and discussions between USAID Mission staff in the Dominican Republic and WASH project staff, WASH was requested to provide--in the Dominican Republic--a demonstration of the utility of microcomputers in: (1) project management; and (2) project outcome evaluations. In order to maximize the appropriateness and applicability of the demonstration, two visits were scheduled to the Dominican Republic. The first trip was for the purpose of identifying and collecting existing secondary data for the demonstration. A second trip was scheduled for the actual conduct of the demonstration.

The following sections present: (1) the approach that was used in the planning and implementation of the demonstration; (2) a description of the data that was available in the Dominican Republic; (3) a description of data preparation, hardware and software selection, and the contents of the actual demonstration; and (4) conclusions and recommendations.

1.2 Approach

Work performed under this project was performed in three phases from needs assessment to final demonstration.

Phase 1/Needs Assessment: An initial visit was made to Santo Domingo the week of June 21-25, 1982, by two RTI staff members: Dr. Kenneth McLeroy, a Health Services Analyst in RTI's Center for Health Studies; and Mr. Michael D. Connelly, a computer systems analyst in RTI's Center for Population and Urban-Rural Studies. The purpose of the trip was to identify current data collection efforts of the health care promoters and determine the applications of this data to assist in monitoring the progress of the Health Sector Loans through use of a microcomputer. As such, meetings were held with Dr. Rivera of the USAID Mission and Dr. Herrera of the Dominican Republic Ministry of Health (MOH), to identify, discuss and document these data and their current and potential applications. This activity included collecting and reviewing examples of all data forms produced by the health promoters and documenting the descriptive and analytic reports desired by the Mission and Ministry of Health for presentation purposes.

Phase 2/Information Assessment and Implementation: Based upon the Phase 1 findings, Phase 2 focused on design of the most appropriate demonstration requirements in terms of necessary presentation content, supporting data elements, microcomputer hardware and software specifications, and demonstration format. A sample of the most complete data was then selected, keyed into the microcomputer utilizing the software selected, edited for accuracy, and manipulated to produce the desired reports for the demonstration.

Phase 3/Demonstration: A second trip to the Dominican Republic was made in September 1982 to present the formal microcomputer demonstration. Specifically, two demonstrations were conducted. The first was scheduled for Ministry of Health (SESPAS) administrators and computer staff. The second demonstration was held at the USAID Mission for all interested Mission staff. The focus of both seminars was directed at demonstrating the potential data manipulation, analysis, and management capabilities of microcomputers by employing the methodologies derived during Phase 2.

Chapter 2

NEEDS ASSESSMENT

2.1 Findings on Data Availability and Sources of Information

Information for monitoring and evaluating the health sector loans is currently being collected by the Division of Rural Health in SESPAS, as well as by UAPODAN. Sources of information include: (1) health promoters located in villages and towns throughout Regions I-VI; (2) area supervisors of the health promoters, frequently located in rural clinics; (3) community health committees; (4) the engineers employed by UAPODAN; and (5) the drilling teams employed by UAPODAN. The types of information collected and submitted by each of these sources are briefly described below.

2.1.1 Health Promoter Information

There are approximately 6,000 health promoters, in almost as many villages and towns, employed by the Government of the Dominican Republic (GODR), as a result of health sector loans I and II. These health promoters currently collect information on a visit-by-visit basis on each of the family members for the approximately 100-300 families for which each of them is responsible. This information is recorded for each family on a 4-page Ficha Familiar form. This form contains information on: housing characteristics; including construction materials, number of rooms, number of beds, water source, latrines, and garbage elimination methods; persons in the household, by age, sex, date of birth, and vaccination history; and visits to the household by date and follow-up actions indicated. The Ficha Familiar is maintained as a record keeping system only, and the forms are not forwarded to SESPAS.

The health promoters currently submit a Monthly Activity Form to the SESPAS central office. This form contains information for each promoter on: number of births, live, still, and total; the number of pregnant women; deaths by age group; and the number of vaccinations administered, by type, dose, and age group. Recent revisions to the data collection system call for the Monthly Activity Form to be summarized by each level of supervisor (3), with the summaries also submitted to SESPAS.

Several new forms have recently been developed by SESPAS for use by the health promoters. As of January, 1982, the health promoters are to submit to SESPAS an annual census by age group of the families for which they are responsible. They will also submit to the area supervisors, on an annual basis, an Annual Registration of Midwives form, which includes the midwives': birth data; reading and writing ability; years of practice; name; location; and certification.

2.1.2 Area Supervisor Information

As a result of the January, 1982, revisions to the SESPAS data collection system, the area supervisors are to collect and maintain--on an annual basis--a summary of health-related information for their service areas. For villages or towns served by health promoters, the primary source of information will be the Ficha Familares maintained by the health promoters. For villages or towns without promoters, the area supervisors or nursing assistants are to collect the requisite information. Data to be summarized and maintained by the area supervisors includes the following:

-- basic data on the promoters, including name, date of entry into the program, and the community served;

-- a human resources file which identifies, by job title and date of entry into the program, the names and addresses of each health worker in the area;

-- a listing of all towns and villages included in the geographic area;

-- a register of midwives; and

-- a summary, by family, for each village (abstracted from the Ficha Familares of each promoter) of the number vaccinated by type of vaccination, the age groupings, the source of water, type of excreta disposal, and method of waste elimination.

There are six separate forms completed in duplicate by the area supervisors to contain the information listed above. One copy is maintained on file by the area supervisors, and one copy is forwarded to the province supervisor.

2.1.3 Community Health Committees

The community health committees are to complete a two-page form on a monthly basis, which is to be sent by mail to the SESPAS central office. The form request information on: (1) the type of water system in the village, including the number of pumps, the number of houses using the system, the number of households which paid their monthly fee, and the number of households not paying; (2) the amount of money raised and paid out; (3) the normal functioning of the water system; (4) visits by maintenance crews; (4) number of latrines opened during the month, and the total number of latrines; (5) the number of latrine covers installed during the month, and the number of houses completed; and (6) village arrangements for waste disposal.

2.1.4 UAPODAN Engineers

In 1982, engineers from UAPODAN visited all of the villages in Region I to obtain information on the number of houses in each

village, the number of houses with latrines in each village, the number of inhabitants in each village, and the number of water pumps.

2.1.5 Drilling Teams

For each well drilled, the well drilling teams submit to UAPODAN a description of the dimensions, location, and materials used. This information is used by Dr. Herrera to issue a monthly invoice for each of the four well drilling companies. The invoice summarizes the number of feet drilled, materials consumed, and the amount of money paid each month, by line item. However, the price per well is not listed.

2.2 Data Selection for the Demonstration

Based on our discussions with Drs. Rivera and Herrera, it was decided to concentrate the microcomputer demonstration on information available for Region I. This decision to concentrate on Region I was made for two reasons. First, all of the wells drilled as part of Health Sector Loan II were drilled in Region I. Second, Region I has the most detailed and readily available information on items of interest. Dr. Herrera was able to supply us with detailed summary charts for Region I--which he had previously developed--which contained the following information:

- information by area, province, and town on the number of inhabitants, houses, and pumps;
- information by area, province, and town on the number of health promoters, houses, inhabitants, and latrines;
- information by area, province, and town on the age distributions of residents;
- information by area, province, and town on the dimensions of each well;
- demographic information on a sample of 100 health promoters; and

-- information by area, province, and town on birth and mortality rates for each of the years 1976-1980.

Much of these data resources were collected during the first trip, with the remainder being sent shortly thereafter.

Chapter 3

DEMONSTRATION DEVELOPMENT

3.1 Demonstration Requirements

Based upon the preliminary needs assessment performed in the Dominican Republic and initial assessment of the available data resources, the following issues were identified as presentation components necessary to the success of the demonstration:

- -- data entry and integrity whereby simple edit checks made to insure data integrity while entering the information into machine readable form would be demonstrated;
- -- data manipulation and aggregation capabilities whereby all data entered into the system could be reviewed, manipulated and/or aggregated at the discretion of the analyst;
- -- statistical tabulations and graphic portrayal providing a means for data analysis and review; and
- -- information management utilizing current file management techniques allowing interactive queries, sorts and report generation.

Each presentation component also stressed the ease of use and "user-friendliness" of a microcomputer. These requirements were then interpreted into a set of hardware and software specifications.

3.1.1 Hardware and Software Selection

Based upon the extensive successful use of the Apple II Plus by USAID and RTI, the Apple microcomputer was selected as an appropriate tool for the demonstration. Given the data storage and software requirements, the configuration leased under this project included two disk drives and a RAM card to bring system memory to 64K. The provision of a monitor, printer and battery power supply were also included in the microcomputer configuration.

Software selection was based upon meeting the defined demonstration requirements. VISICALC, a general purpose spread sheet software package running on the Apple II, was chosen for its versatility. It is well suited to the data entry, manipulation and aggregation requirements of the demonstration. As such, it found numerous applications.

Supplementing the data entry and manipulation capabilities of VISICALC was the fully compatible VISIPLOT/VISITREND package. Capable of using VISICALC files, the VISIPLOT/VISITREND programs were utilized to provide (1) graphic presentations; and (2) statistical tabulations. As a graphics program, VISIPLOT displayed comparative line, bar, scatter and pie charts of the analysis data. VISITREND supplemented the analyses by providing time series, regression and simple statistical analyses.

A third package in the integrated VISI software, VISIFILE, was evaluated during demonstration development as a means of file management. Its use, however, was slow and cumbersome and, as such, an alternate file management package, VERSAFORM, was selected for demonstration purposes. VERSAFORM's highly versatile data entry editing capabilities, combined with efficient search, sort and report methods was well suited to the needs of the Dominican Republic Demonstration.

3.1.2 Data Elements Defined

Based upon discussions with Drs. Rivera and Herrera in the Dominican Republic and initial examination of the data forms brought back, the Region 1 data resources to be utilized in the demonstration were defined as follows:

A. Census data for the Region I Areas of San Juan, Azua, Peravia, and Elias Pina. Data elements keyed at the village level and aggregated to the Seccion and Municipality levels included:

-- Total age less than 1
-- Total age 1-4
-- Total age 5-9
-- Total age 10-14
-- Total age 15-49
-- Male age 15-49
-- Female age 15-49
-- Total age over 49

B. UAPODAN Engineers data for the areas of San Juan, Azua, and Peravia. Data elements keyed at the village level and aggregated to seccion and Municipality included:

-- # houses
-- # houses with latrines
-- # inhabitants
-- # water pumps.

C. Birth and mortality data from 1977 to 1980 for the area of Azua. Data elements keyed at the Seccion level included:

-- deaths age less than 1 1978-1980
-- deaths age 1-4 1978-1980
-- deaths total 1978-1980
-- live births 1978-1980

D. Promoter data for a small sample of promoters. Data elements keyed by promoter include:

-- name
-- age
-- sex
-- village assigned
-- Seccion
-- Municipality
-- Area

E. Well engineering data: While specific data elements were not available during presentation development, a presentation format was established to demonstrate a well cost management technique if given the materials used and unit cost of the materials.

The problems encountered in preparing the computer files for the demonstration focused on (1) the lack of coordination and consistency between each of the data resources, and (2) numerous hand tabulation errors. These issues were resolved by focusing the analysis on areas where a high degree of correlation and accuracy existed. Tabulations were corrected when possible.

3.2 Demonstration Content and Format

As previously stated, the immediate objectives of the presentations were to demonstrate: (1) data entry and manipulation; (2) data analysis; and (3) information management. Given the extent of data available, multiple applications were developed to cover each of the issues.

The first part of each of the two demonstrations focused on the primary purpose of the demonstrations in the Dominican Republic: to present the potential applications of microcomputers for managing and analyzing information related to the USAID health sector loans. It was stressed that the data presented was for demonstration purposes only, and should not be interpreted as an analysis of the current program.

To demonstrate simple data manipulation and analysis techniques, village level census data from the province of San Juan were displayed via VISICALC. (Comparable displays for Azua, Peravia and Elias Pina were also developed for presentation.) Data aggregation capabilities were presented by summing village level data to the Seccion and Municipality levels (see Figure 1). Simple comparative analysis variables were then created and manipulated on screen. These included:

-- population age < 1 / total population

-- population age < 1 / women age 14-49

-- men age 14-49 / women age 14-49.

Figure 1

AREA SAN JUAN

POBLACION CENSADA POR GRUPOS DE EDADES, SEGUN LOCALIDADES. JULIO 1979

PARAJE	AREA/MUN./SECCION	<1	1-4	5-9	10-14	HOMBRES 15-49	MUJERES 15-49	50	TOTAL	<1/TOTAL	<1/MUJ.	HOM/MUJ
	SECCION- BOHECHIO	246	900	954	863	1321	1317	514	6115	4.02	18.68	1.00
MUNICIP-	BOHECHIO	246	900	954	863	1321	1317	514	6115	4.02	18.68	1.00
	SECCION- LA DIENADA	245	766	850	705	1127	1147	448	5288	4.63	21.36	0.98
	SECCION- DERRUMBADERO	482	1218	1387	1163	1744	1890	610	8484	5.34	25.52	0.92
	SECCION- EL PINAR	305	1023	1469	1127	1780	1726	795	8225	3.71	17.67	1.03
MUNICIP-	EL CERCADO	1002	3007	3706	2995	4651	4763	1953	21977	4.56	21.04	0.98
	SECCION- CARRERA DE YEGUA	406	1091	1388	1260	1872	1536	598	7821	5.19	26.43	1.22
	SECCION- LAS CARRERAS	360	1040	1267	1137	1382	1550	643	7379	4.87	23.23	0.89
	SECCION- LA ESTANCIA	324	1147	1613	1381	1939	1738	742	8882	3.65	18.66	1.12
	SECCION- MATA YATA	163	631	851	800	1068	1045	368	4926	3.31	15.60	1.02
	SECCION- YABONICO	447	1370	1939	1745	2295	2159	1087	11045	4.05	20.70	1.06
MUNICIP-	MATAS DE FARFAN	1700	5279	7045	6223	8159	8026	3438	40373	4.24	21.18	1.02
	SECCION- CHALONA	384	655	794	633	910	888	367	4611	7.89	40.99	1.03
	SECCION- CHARCAS DE MARIA N	171	612	740	607	897	865	445	4347	4.39	22.08	1.07
	SECCION- BLANITO	186	484	617	497	702	787	265	3438	5.41	23.63	0.89
	SECCION- HATO DEL PADRE	146	395	734	662	907	848	399	4094	3.57	17.22	1.07
	SECCION- HATO NUEVO	235	759	1091	812	1058	1148	481	5584	4.21	20.47	0.92
	SECCION- LA JAGUA	67	165	225	153	216	282	117	1347	4.97	23.76	1.03
	SECCION- JUAN HERRERA	540	1639	2240	1973	2786	2873	1115	13186	4.10	18.80	0.97
	SECCION- MOGOLLON	360	1133	1600	1417	2035	1967	742	9254	3.89	18.30	1.03
	SECCION- PEDRO CORTO	209	655	831	731	1022	988	361	4797	4.36	21.15	1.03
	SECCION- PUEBLO NUEVO	287	851	1071	991	1422	1400	511	6533	4.39	20.50	1.02
	SECCION- LA ZANJA	198	614	801	739	994	1001	400	4747	4.17	19.78	0.99
MUNICIP-	SAN JUAN DE LA MAGUANA	2783	7965	10644	9257	13019	13047	5203	61918	4.49	21.33	1.00
	SECCION- CAPULIN	121	286	360	300	411	394	131	2003	6.04	30.71	1.04
	SECCION- JORGILLO	117	441	536	420	671	713	244	3144	3.72	16.41	0.94
	SECCION- RIO ARRIBA DEL SUR	88	147	240	267	257	241	51	1291	6.82	36.51	1.07
	SECCION- SABANA GRANDE	77	240	293	213	308	311	103	1542	4.99	24.76	0.99
	SECCION- VALLEJUELO	12	24	40	26	50	36	18	206	5.83	33.33	1.39
MUNICIP-	VALLEJUELO	415	1138	1471	1226	1674	1695	547	8186	5.07	24.48	1.01
AREA -	SAN JUAN	6146	18285	23823	20664	28944	28846	11553	139269	4.44	21.30	1.00

MINIMUM VALUES = 3.31 15.60 0.89

MAXIMUM VALUES = 7.89 40.99 1.39

Simple statistics were then used to identify villages in the database with values at the minimum or maximum of the scale.

Given the ease of using VISICALC for the demonstration, it was possible to interactively create comparative analyses of specific variables through manipulation of the base line census data.

Similar presentation formats were developed for the UAPODAN engineer's data (see Figure 2). VISICALC was employed to demonstrate:

-- # latrines/household

-- # wells/village inhabitant

-- # village inhabitants/promoter

As in the census data demonstration, simple statistics were used to identify those villages (and Seccions) with the highest and lowest values on the variables created.

Births and mortality data for Azua were available for similar presentation. Given the time series nature of the Azua data, analyses focused on the change over time for each data element.

The next presentation component, and probably best received, was the graphic analysis display. VISIPLOT was employed to present color graphic representations of any of the data elements or created variables previously presented under VISICALC. The types of displays included single and side-by-side comparative graphics using line graphs, bar charts, pie charts and scatter plots. Some of the more interesting presentations included (see Figures 3 through 5):

-- Bar charts where each bar represented a Seccion's value for one of the comparative analysis variables, e.g.,

    population age < 1/total population
    women age 14-49/total population
    latrines/household;

Figure 2

AREA SAN JUAN

		NO. DE VIVIENDAS	NO. DE HABITANTES	LETRINAS EN COMUNIDAD	LETRINAS QUE FALTA	LETRINAS /VIVIEN	LETRINAS /HABIT
SECCION-	LA CIENAGA	597	3464	74	523	0.12	0.02
SECCION-	DERRUMBADERO	1491	9127	161	1330	0.11	0.02
SECCION-	EL PINAR	577	3607	51	526	0.09	0.01
SECCION-	NORTE MAYOR	152	790	1	151	0.01	0.00
SECCION-	SAL.DE LA LOMA	145	711	3	142	0.02	0.00
SECCION-	LA RANCHA	847	5000	73	774	0.09	0.01
MUNICIP-	EL CERCADO	3509	23199	363	3146	0.10	0.02
SECCION-	CARRERA DE YEGUA	1341	8286	401	940	0.30	0.05
SECCION-	LAS CARRERAS	219	1281	27	192	0.12	0.02
SECCION-	EL HATO	285	1773	20	265	0.07	0.01
SECCION-	LA ESTANCIA	1098	7110	229	869	0.21	0.03
SECCION-	LA MULA	449	3275	29	420	0.06	0.01
SECCION-	MATA PAYA	462	3041	214	248	0.46	0.07
SECCION-	OLIVERO	193	1275	15	178	0.08	0.01
SECCION-	LOS JOBOS	336	1694	134	202	0.40	0.08
SECCION-	LOS COFEYES	596	3568	113	483	0.19	0.03
SECCION-	MASONICO	596	3395	189	407	0.32	0.06
SECCION-	PAJONAL	357	2246	35	322	0.10	0.02
MUNICIP-	MATAS DE FARFAN	5932	36946	1406	4526	0.24	0.04
SECCION-	CHALONA	456	2928	31	425	0.07	0.01
SECCION-	BARRANCA	249	1760	37	212	0.15	0.02
SECCION-	CHARCAS DE MARIA N	165	1050	8	157	0.05	0.01
SECCION-	GUANITO	753	3416	157	596	0.21	0.05
SECCION-	HATO DEL PADRE	720	4681	151	569	0.21	0.03
SECCION-	LA JAGUA	876	5266	63	813	0.07	0.01
SECCION-	JUAN HERRERA	914	4870	85	829	0.09	0.02
SECCION-	MOGOLLON	300	947	19	281	0.06	0.02
SECCION-	PEDRO CORTO	755		76	679	0.10	
SECCION-	PUEBLO NUEVO	1555	9373	477	1078	0.31	0.05
SECCION-	EL CACHEO	503	2631	14	489	0.03	0.01
SECCION-	LA ZANJA	698	3419	103	595	0.15	0.03
MUNICIP-	SAN JUAN	7944	40371	1221	6723	0.15	0.03
SECCION-	CAPULIN	334	2123	25	309	0.07	0.01
SECCION-	JORGILLO	399	2627	43	356	0.11	0.02
SECCION-	RIO ARRIBA DEL SUR	186	1193	22	164	0.12	0.02
SECCION-	SABANA GRANDE	269	1516	16	253	0.06	0.01
MUNICIP-	VALLEJUELO	1188	7459	106	1082	0.09	0.01
AREA -	SAN JUAN	18873	107975	3096	15777	0.16	0.03

MINIMUM VALUE = .0065789 .0012659
MAXIMUM VALUE = .4632035 .0791027

Figure 3a

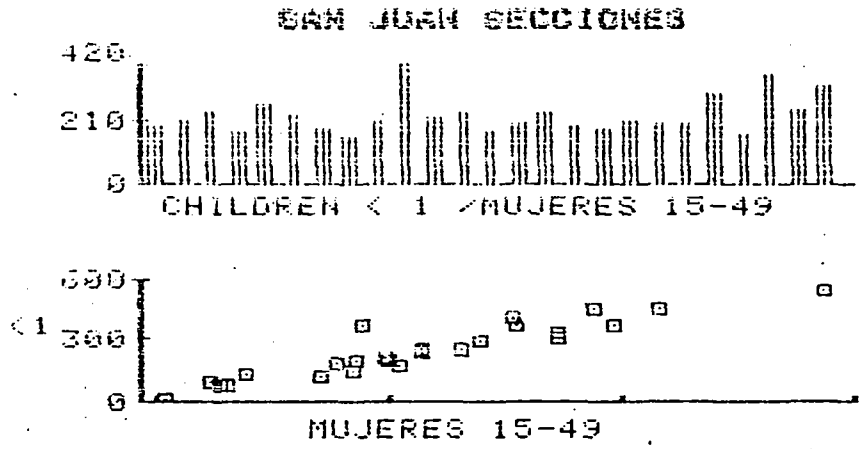


Figure 3b

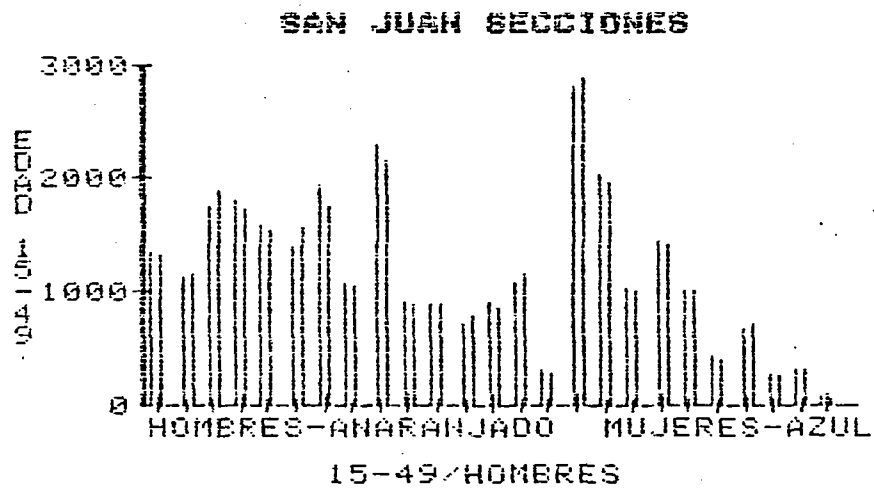


Figure 4a

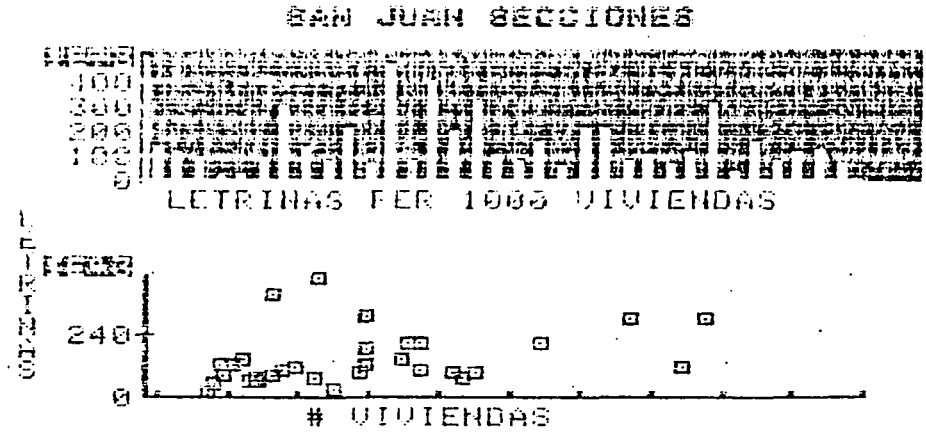


Figure 4b

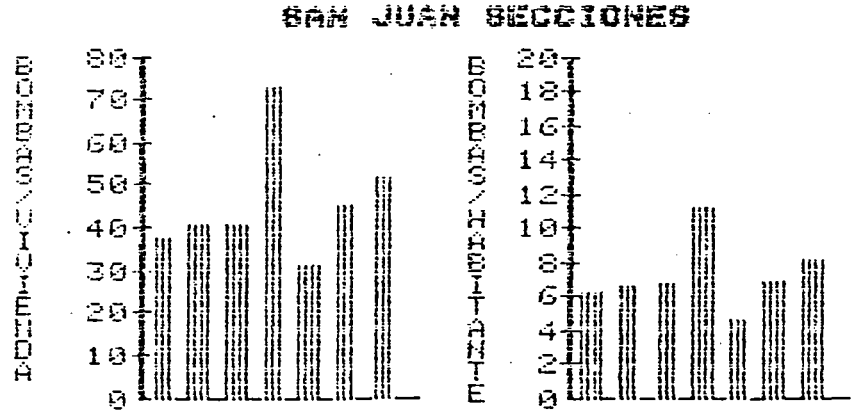


Figure 4c

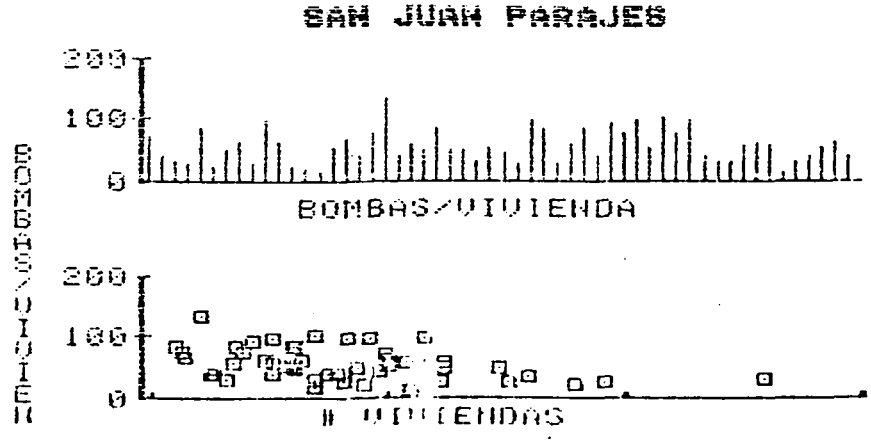
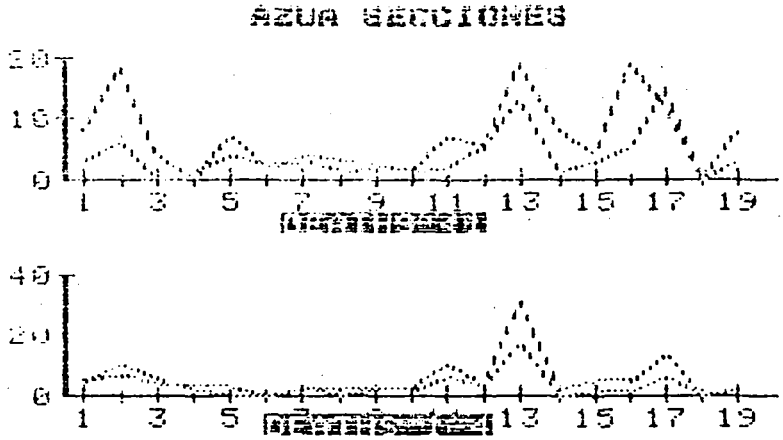


Figure 5



-- pie charts presenting the age composition of a geographical area; and

-- scatter plots of:

  --- size of village vs. latrines/household
  --- # births vs. wells/village inhabitant
  --- mortality vs. latrines/household.

VISITREND was employed to demonstrate the use of simple regression and time series analyses. While time series data was limited to Azua's birth and mortality data, it was sufficient to demonstrate the potential applications of such analysis tools.

The final parts of the two presentations focused on the usefulness of an information management system. This was demonstrated by applying VERSAFORM to establish a file management system to maintain records on each of the health promoters. A small subset of promoters was extracted and keyed to the system (see Figure 6). VERSAFORM provided a means to demonstrate the following:

-- data integrity on entry--each field keyed had an associated set of edit checks ranging from lookups (entry of the village name could extract the Seccion and Municipality) to automatic data entry and numeric range checks;

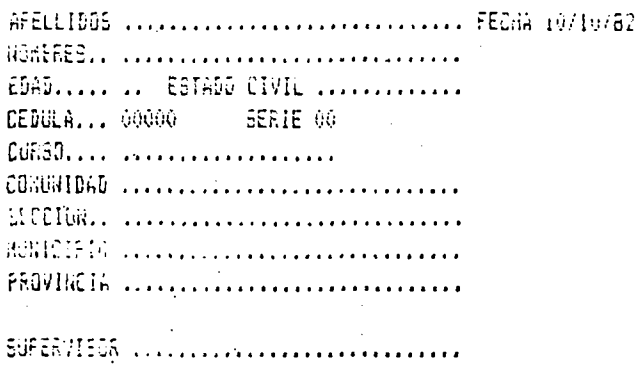
-- search capabilities providing the user a simple means to query the database;

-- sorting facilities to extract and list information in pre-specified sort orders; and

-- reporting capabilities whereby user defined report formats could be created to generate reports in a manner conducive to the needs of the user.

Similar capabilities were also discussed as they applied to inventory management and well cost accounting.

Figure 6


APELLIDOS ..... FECHA 10/10/82
NOMBRES.. .....
EDAD..... .. ESTADO CIVIL .....
CEDULA... 00000 SERIE 00
CURSO.... .....
COMUNIDAD .....
SECCION.. .....
MUNICIPIO .....
PROVINCIA .....
SUPERVISOR .....

Chapter 4

FORMAL PRESENTATIONS

The formal presentations were held in Santo Domingo during the week of September 27, 1982. Given the extent of the presentation, a preliminary demonstration was held at the USAID Mission with Dr. Rivera to resolve inconsistencies in the content or format of the presentations and to prioritize the components that Dr. Rivera considered of primary interest to the study.

Two formal presentations were scheduled. The first was a presentation to Ministry of Health administrators and computer staff. Ken McLeroy presented the demonstration, in Spanish, by focusing on the capability of the microcomputer as applied to the health sector loans. The second demonstration was held at the USAID Mission for all interested staff. Conducted by Mike Connelly, this session was held in English.

In all presentation components, emphasis was placed on demonstrating the "user-friendliness" of the microcomputer. It was felt that a critical component of this presentation was to overcome the "fear of the computer" that many novice users often experience when confronted with this technology. Interestingly, this rarely presented itself as a problem. Most participants of the demonstration were eager to discuss microcomputer capabilities across a wide variety of applications.

Chapter 5

SUMMARY AND CONCLUSIONS

The demonstrations in the Dominican Republic were well received and generated considerable interest. Interestingly, there appeared to be an equal amount of interest in the microcomputer state-of-the-art as there was with application to the health sector loans. The presentation at the USAID Mission produced a considerable amount of interest resulting in ad-hoc discussions with several Mission staff who already own or have access to microcomputers. There appears to be a wide-spread interest in the rapid advancement of microcomputer technology and its potential applications in developing countries.

Based upon the success of this demonstration project, two recommendations can be made.

1. Microcomputer demonstrations provide a unique blend of substantive and technological issues resulting in considerable interest and enthusiasm by those involved. As such, it is highly recommended that these be continued and supported in other settings.

2. Given the nature and interest in microcomputer technology, future demonstrations should include formal presentations on the state-of-the-art and industry. While an Apple microcomputer is a good demonstration tool, presentations should also include some discussion of other popular hardware, operating systems and software.

APPENDIX B

Health-Related Activity and Status Forms

APPENDIX B

Health-Related Activity and Status Forms

I. BACKGROUND

As part of the WASH micro-computer demonstration in the Dominican Republic, an initial visit was made to Santo Domingo from June 21-25, 1982. The visit was made by two RTI staff members: Kenneth McLeroy, a Health Services Analyst in RTI's Health Research Center and Michael Connelly, a computer specialist in RTI's Center for Population and Urban-Rural Studies. The purpose of the trip was to identify and describe current data collection efforts as part of the U.S.A.I.D. health sector loans. Based on the findings of this initial trip, data were to be requested and used in a micro-computer demonstration in Santo Domingo, scheduled for September 1982. This report represents the findings of that trip, and includes a description of current data collection activities. This report is based primarily on interviews with Drs. Herrera and Rivera of the Dominican Republic Ministry of Health (SESPAS) and the U.S.A.I.D. Mission, respectively.

II. DATA DESCRIPTION(S)

A. Sources of Information

Information for evaluating the Health Sector Loan II is currently being collected by the Division of Rural Health in SESPAS. Sources of information include: (1) health promoters located in villages and towns throughout Regions I-VI; (2) area supervisors of the health promoters, frequently located in rural clinics; and (3) community health committees. The types of information collected and submitted by each of these sources are briefly described below.

1. Health Promoter Information

There are approximately 6,000 health promoters, in almost as many villages and towns, employed by the Government of the Dominican Republic (GODR), as a result of health sector loans I and II. These health promoters currently collect information on a visit-by-visit basis on each of the family members for the approximately 100-300 families for which each of them is responsible. This information is recorded for each family on a four-page Ficha Familiar form. This form contains information on: housing characteristics including construction materials, number of rooms, number of beds, water source, latrines, and garbage elimination methods; persons in the household, by age, sex, date of birth, and vaccination history; and visits to the household by date and followup actions indicated. The Ficha Familiar is maintained as a record-keeping system only, and the forms are not forwarded to SESPAS.

The health promoters currently submit a Monthly Activity Form to the SESPAS central office. This form contains information for each promoter on: number of births--live, still, and total; the number of pregnant women; deaths by age group; and the number of vaccinations administered, by type, dose, and age group. Recent revisions to the data collection system* call for the Monthly Activity Form to be summarized by each level of supervisor (3), with the summaries also submitted to SESPAS.

Several new forms have recently beeen developed by SESPAS for use by the health promoters.* As of January 1982, the health promoters are to submit to SESPAS an annual census by age group of the families for which they are responsible. They will also submit to the area supervisors, on an annual basis, an Annual Registration of Midwives form, which includes the midwives': birth data; reading and writing ability; years of practice; name; location; and certification.

2. Area Supervisor Information

As a result of the January 1982 revisions to the SESPAS data collection system,* the area supervisors are to collect and maintain--on an annual basis--a summary of health-related information for their service areas. For villages or towns served by health promoters, the primary source of information will be the Ficha Familares maintained by the health promoters. For villages or towns without promoters, the area supervisors or nursing assistants are to collect the requisite information. Data to be summarized and maintained by the area supervisors include the following:

a) basis data on the promoters, including name, date of entry into the program, and the community served;

b) a human resources file which identifies, by job title and date of entry into the program, the names and addresses of each health worker in the area;

c) a listing of all towns and villages included in the geographic area;

d) a register of midwives; and

e) a summary, by family, for each village (abstracted from the Ficha Familares of each promoter) of the number vaccinated by type of vaccination, the age groupings, the source of water, type of excreta disposal, and method of waste elimination.

There are six separate forms completed in duplicate by the area supervisors to contain the information listed in (e) above. One copy is maintained on file by the area supervisors, and one copy is forwarded to the province supervisor.

3. Community Health Committees

* These revisions have only been implemented in a single region.

The community health committees are to complete a two-page form on a monthly basis, which is to be sent by mail to the SESPAS central office. The form requests information on: (1) the type of water system in the village, including the number of pumps, the number of houses using the system, the number of households which paid their monthly fee, and the number of households not paying; (2) the amount of money raised and paid out; (3) the normal functioning of the water system; (4) visits by maintenance crews; (5) number of latrines opened during the month, and the total number of latrines; (6) the number of latrine covers installed during the month, and the number of houses completed; and (7) village arrangements for waste disposal.

APPENDIX C

Inventory Control Forms

SECRETARÍA DE ESTADO DE SALUD PÚBLICA Y ASISTENCIA SOCIAL

PROGRAMA DESARROLLO SECTOR SALUD II PRÉSTAMO AID No. 517-U-030

SOLICITUD DE DESPACHO DE MATERIALES

FECHA_____ 1983

SDM-No._____

Al : Encargado de Almacén

de:_____

SU DESPACHO.

Asunto : Despacho de materiales.

Por medio de la presente le autorizamos a despachar los siguientes materiales:

Tipo de Material	Cantidad Solicitada	Cantidad Despachada

Estos materiales serán utilizados en:_____

en las comunidades de:_____

Aprobado por:

Dr. José M. Herrera Cabral,
Coordinador General Acuerdo
Desarrollo Sector Salud II.

Firma del Solicitante:

_____

Cargo:

DP.-

SECRETARÍA DE ESTADO DE SALUD PÚBLICA Y ASISTENCIA SOCIAL

PROGRAMA DESARROLLO SECTOR SALUD II PRÉTAMO AID No. 517-U-030

SOBRANTE DE MATERIALES

Fecha_____1983

SM-No._____

Al : Encargado de Almacén
de:_____.
SU DESPACHO.

Asunto : Devolución de materiales.

Por medio de la presente le estamos devolviendo los siguientes materiales:

TIPO DE MATERIAL	CANTIDAD

Estos materiales fueron devueltos por:_____

_____

Que se utilizaron en las comunidades de:_____

_____

ENTREGADO POR RECIBIDO

_____. _____.

SECRETARIA DE ESTADO DE SALUD PUBLICA Y ASISTENCIA SOCIAL

OFICINA DE COORDINACION GENERAL

REPORTE DE RECEPCION EN ALMACEN

Fecha_____ Lugal_____ Recepción No. 045

Suministrante_____ Orden de Compra No._____

Entregado por_____ Representante del Vendedor

Entregado por_____ Empleado de SESPAS

REFERENCIAS DE LOS SUMINISTROS	CODIGO	UNIDAD	CANT.	PRECIO UNIDAD	VALOR	

OBSERVACIONES:_____

_____

_____

_____

RECIBIDO CONFORME

ENCARGADO DE ALMACEN

SECRETARIA DE ESTADO DE SALUD PUBLICA Y ASISTENCIA SOCIAL

TARJETERO ALMACEN

ARTICULO _____	CODIGO	LOCALIZACION

FECHA	Orden de Compra No.	Número del Pedido	DESTINO	ESPECIE		
				ENTRADA	SALIDA	EXISTENC

IMP. COMAS

SECRETARIA DE ESTADO DE SALUD PUBLICA Y ASISTENCIA SOCIAL

SESPAS

UNIDAD DE AGUA POTABLE Y DISPOSICION DE AGUAS NEGRAS

CONDUCE. 266

FECHA: _____

Solicitud y Despacho de Suministros Núm. _____

DETALLE DE MERCANCIA DESPACHADA

DESCRIPCION	CANTIDAD
NOTA: ESTE FORMULARIO FUNCIONA CON UN ORIGINAL Y UNA COPIA. SE DETALLA LOS MATERIALES QUE VAN HACER ENVIADOS A UNA DE LAS UNIDADES DE ESTA OFICINA.	
ORIGINAL: ES RETENIDO POR EL ENCARGADO DEL ALMACEN, DESPUES QUE SE LE ENTREGAN LOS MATERIALES A LA PERSONA CORRESPONDIENTE ESTE LO DEVUELVE FIRMADO.	
COPIA: LA COPIA LA RETIENE LA PERSONA QUE RECIBE LOS MATERIALES.	

Editorama 2451

ALMACENISTA PROCEDENCIA

ALMACENISTA DESTINO

CONDUCTOR

Céd. _____ S. _____

OBSERVACIONES: _____

Placa No. _____

SECRETARIA DE ESTADO DE SALUD PUBLICA Y ASISTENCIA SOCIAL
UNIDAD DE AGUA POTABLE Y DISPOSICION DE AGUA NEGRA

SOLICITUD Y DESPACHO DE SUMINISTROS

Fecha: _____ DESPACHO No. 0264

Entréguese el material para ser utilizado en _____

Solicitado: _____ Autorizado: _____ Aprobado: _____

INSTRUCCIONES:
1.– El solicitante debe llenar esta solicitud en cuadruplicado a máquina.
2.– Debe cerrar la solicitud mediante una "última línea" debajo del último artículo pedido.

DESCRIPCION DE LOS ARTICULOS	CANTIDAD		OBSERVACIONES
	SOLICITADA	DESPACHADA	
NOTA: Este formulario funciona con			
UN ORIGINAL Y TRES COPIAS.–			
ORIGINAL: Es retenido por el encargado			
de almacen.			
COPIA AMARILLA: Se le envia a donde es			
enviado los materiales			
COPIA ROSADA – CONTRALORIA, para			
fines de archivo.			
COPIA AZUL: Contabilidad —			
Ademas este formulario es			
previamente Numerado			
con la finalidad de control.			

56

p.a Almacen

Colorama Offset 565-6062

RECIBIDA CONFORME: _____

República Dominicana

Secretaría de Estado de Salud Pública y Asistencia Social

DESPACHO DE LETRINAS

Fecha_____1983

Señor Director del Hospital _____

de la provincia_____Municipio_____

Por este medio solicitamos autorización para trasladar -

_____ letrinas completas (2 losas, asiento y tapa por cada una), a la comunicad de_____

_____ municipio de_____

para ser instaladas en esa comunidad, en el vehiculo_____

_____placa_____ cuyo conductor es el señor_____.

Atentamente le saluda,

Ing. Elpidio Caba,
Asesor Técnico Programa Sector
Salud II. Préstamo AID No.517-U-030.

EC/mit.

APPENDIX D

Activity Reporting Forms

CONTRATISTA: ______________________

CUBICACION No. ______________________ FECHA: ______________________

[illegible]	PERFO-RACION	CAMISA	12.00	14.75	16.00	4.75	4.00	14.00	7.25	7.75	RANURAS	RESCATE	RESULTADOS AGUA	SECO	MATERIAL	

Form. AT 06

INSTALACION DE BOMBAS

Fecha: _____

Comunidad: _____

Pozo perforado frente a la casa de la señora: _____

_____

Profundidad: _____

Materiales usados:

Tipo de Bomba: _____

Varillas: _____

Couplings de varilla: _____

Tuberías (tipo y cantidad) _____

Filtro ó Checker: _____

Si la bomba es tipo modificada se usará además:

1 Niple 2" x 6"
1 Niple 3/4" x 2"
1 Adaptador hembra 2" P.V.C.
1 Reducción Galvanizada de 1-1/4" a 3/4"
_____ guias o estabilizadores
_____ cemento P.V.C.

_____ INSTALADOR

_____ RECIBIDA Y ACEPTADA

NOTA: En caso de rotura de cualquier pieza, favor reportarlo.

EC/dp.-

orm. AT-01

FORMULARIO INSTALACION DE LETRINAS

Comunidad:

No.	Fecha	BFNEFICIARIO	CEDULA	SERIE	Albañil
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

SUPERVISOR:

Form. AT-05

FORMULARIO DISTRIBUCION DE RECIPIENTES DE 20 GALONES

No.	Fecha	Comunidad	Beneficiario	Recibo No.
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

Asistente Unidad de Promoción y Educación.

Form. AT-04

REPARACION DE BOMBAS

Comunidad: _____

Bomba instalada frente a la casa de la señora: _____

_____

Tipo de reparación: _____

_____

Cantidad de bombas reparadas en esta Comunidad: _____

Fecha: _____

_____ _____

ENC. BRIGADA PROMOTOR

NOTA: 1- La Promotora y el Comité de Salud deben mantener lubricadas todas las bombas de la Comunidad.

2- Usese un formulario por cada bomba reparada.

EC/dp.-

SECRETARIA DE ESTADO DE SALUD PUBLICA
Y ASISTENCIA SOCIAL (SESPAS)

REPARACION DE PLATAFORMAS

Nombre de la comunidad _____.

Municipio _____.

Cantidad de plataformas en la comunidad _____,

plataforma No. _____ drenaje Para desague

Sí _____ No _____, tipo de reparación _____

_____

_____.

La bomba está funcionando, Sí _____No_____.

Fecha _____

Albañil _____

Supervisor _____

Asistente _____

Promotora _____

OBSERVACIONES _____

_____

_____

_____

APPENDIX E

Village Health Committee Monthly Reporting Forms

SECRETARIA DE ESTADO DE SALUD PUBLICA Y ASISTENCIA SOCIAL

INTEGRACION COMUNITARIA

INFORME MENSUAL COPROMESA / APOSA

REGION _____ MUNICIPIO _____

PROVINCIA _____ PARAJE _____

INFORME CORRESPONDIENTE AL MES DE : _____

I.- SISTEMA DE AGUA

[ ] POR GRAVEDAD

[ ] POZO Y BOMBAS ¿CUANTAS BOMBAS HAY INSTALADAS ? _____

1.- ¿ CUANTAS VIVIENDAS ESTAN USANDO EL SISTEMA DE AGUA? _____

2.- ¿ CUANTAS VIVIENDAS PAGARON SU CUOTA EN EL MES? _____

3.- ¿ CUANTAS VIVIENDAS NO PAGARON SU CUOTA EN EL MES? _____

4.- ¿ TOTAL DE DINERO RECOGIDO EN EL MES (INGRESOS)? _____

5.- ¿ TOTAL DE DINERO GASTADO EN EL MES (EGRESOS)? _____

6.- ¿ CUAL FUE EL BALANCE DEL MES (INGRESOS -EGRESOS)? _____

7.- ¿ TOTAL DE DINERO ACUMULADO EN CAJA ? _____

8.- ¿ HA ESTADO FUNCTONANDO NORMALMENTE DURANTE EL MES EL SISTEMA DE AGUA _____

_____

_____

9.- ¿ LE HICIERON ALGUNA REPARACION DURANTE EL MES LOS ENCARGADOS DE LA COMUNIDAD? _____

_____

_____

10.- ¿ VISITO DURANTE EL SISTEMA DE AGUA ALGUN MIEMBRO DEL EQUIPO DE MANTENIMIENTO REGIONAL DE SALUD PUBLICA? _____

_____

11.- ¿ MENCIONE LOS GASTOS DE DINERO QUE SE HICIERON EN EL MES? _____

1° _____

2° _____

3° _____

4° _____

12.- ¿ VISITO DURANTE EL MES EL SISTEMA DE AGUA ALGUN OFICIAL DE SA NEAMIENTO AMBIENTAL DE SALUD PUBLICA_____

_____

_____

II LETRINAS

1.- ¿ CUANTOS HOYOS DE LETRINAS HAY ABIERTOS EN LA COMUNIDAD?____

2.- ¿ CUANTOS DE ESOS HOYOS SE ABRIERON EN EL MES?_____

3.- ¿ CUANTAS LETRINAS(PISO Y ASIENTO)SE COLOCARON EN EL MES?____

4.- ¿ CUANTAS CASETAS SE CONSTRUYERON EN EL MES ?_____

III BASURA

1.- ¿ HAY BASURA APILADA EN LA COMUNIDAD?_____

_____

2.- ¿ SE QUEMO O ENTERRO BASURA DURANTE EL MES?_____

_____

3.- ¿ QUE ESTA HACIENDO EL COPROMESA PARA QUE LAS FAMILIA DE LA COMUNIDAD QUEMEN O ENTIERREN LA BASURA?_____

_____

_____

_____

_____

COMENTARIO :_____

_____

_____

_____

_____

FIRMA DEL PRESIDENTE DEL COMITE_____

FIRMA DEL SECRETARIO TESORERO _____

APPENDIX F

Health Education Activity Reporting Forms

UNIDAD DE PROMOCION Y EDUCACION OPERACIONES DE CAMPO

PROGRAMA SEMANAL DEL _____ AL _____ ZONA: _____

OBJETIVOS DEL PROGRAMA PARA LA SEMANA _____

NOMBRE DEL PROMOTOR	LUNES	MARTES	MIERCOLES	JUEVES	VIERNES	ACTIVIDADES

OBSERVACIONES: _____

SECRETARIA DE ESTADO DE SALUD PUBLICA Y ASISTENCIA SOCIAL
UNIDAD DE PROMOCION Y EDUCACION

FORM. L-1

INSTALACION DE LETRINAS

Nombre de la comunidad _____,

Municipio _____ Cantidad de personas _____,

Número de casas sin letrinas _____ Cantidad de letrinasaveriadas _____

_____ , fecha inicio _____,fecha terminación _____,

cantidad de bombas sin instalar _____,

Albañil _____.

Supervisor _____.

Promotor _____.

OBSERVACIONES _____

_____

_____

_____

_____

UNIDAD DE PROMOCION YEDUCACION

Supervisor _____ Comunidad _____

Asistente _____

VISITAS DOMICILIARIAS			LETRINAS INSTALADAS			
1	11	21	31	41	51	61
2	12	22	32	42	52	62
3	13	23	33	43	53	63
4	14	24	34	44	54	64
5	15	25	35	45	55	65
6	16	26	36	46	56	66
7	17	27	37	47	57	67
8	18	28	38	48	58	68
9	19	29	39	49	59	69
10	20	30	40	50	60	70
TOTALES						

APPENDIX G

Microcomputer Application Considerations

MICROCOMPUTER APPLICATION CONSIDERATIONS

Microcomputer Industry Growth

Since the production of the first personal computer in 1975, the Altair 8800, microcomputer technology has made incredible strides. Price reductions through technological advancements, the application of high volume production techniques and fierce industry competition have contributed to placing microcomputers in the forefront of the marketplace today. Hardware that once relied on vacuum tubes quickly advanced through transitors and integrated circuits to what is now commonly referred to as "computer-on-a-chip" technology. Software also went through significant improvements. Microprocessors that once provided only games or limited programming in BASIC to the average user now affords many languages such as COBOL, PASCAL, FORTRAN, C, and FORTH as well as a wide variety of operating systems and utility software. More important to the advancement of this industry has been the tremendous strides in applications software such as spreadsheets, wordprocessing, database management and communications. It has often been stated that the development of spreadsheet software such as VISICALC has done more to advance the microcomputer industry than any other single factor.

It has been estimated that over 8 million personal computers will be situated on office desks by 1990. Executives, middle management, and clerical staff are finding more applications daily which contribute to their effectiveness and productivity. With literally thousands of application packages on the market, laypeople are finding that microcomputers can be easily adapted to their daily routine without extensive training.

One of the driving forces behind the rapid advancement of this industry is the phenomena of non-technical people utilizing microcomputers in a diverse array of cost-effective applications. Until recently, the need to computerize required the support of trained computer professionals. Small businesses were faced with the decision to contract for expensive consulting services or hire within. Larger businesses with established data processing departments were forced to face a continuous backlog of applications placed on an overworked DP staff. In many cases, time and cost prohibited the development of these products.

Then along comes a low cost, desktop computer with a full complement of software and pheripherals specifically designed for applications that were previously too expensive, too time consuming, or simply still in the DP backlog. More importantly, these computers could be used by non-computer staff and used effectively. Thus, there is now a high proliferation of microcomputers appearing throughout businesses and organizations performing functions previously not feasible for computerization in this environment.

A significant problem, however, in this ever increasing

industry lies in the area of system selection and configuration and the provision of support beyond simple applications. There are far too many hardware, software and peripheral options to be able to fully evaluate and select the "best" configuration for any given application environment. Far too many microcomputer acquisitions have been made based on an inadequate evaluation or understanding of user need. In addition, the new microcomputers on the market are fully capable of assuming many of the more complex tasks typically targeted for larger computer applications. These can include database management systems, communications, networking, and extensive programming efforts. The computerization of these complex functions, however, still requires a high degree of technical expertise and training to insure sucessful implementation.

Considerations for Microcomputer Acquisition

There are three primary concerns in selecting a microcomputer configuration:

- immediate requirements
- expansion potential
- compatibility of hardware, software and peripherals

Each of these concerns must also entail consideration for the degree of technical expertise required to support the intended applications and hardware. Although many of the immediate needs do not require a technical expertise, microcomputers are all too often acquired based solely on the immedidate needs of the user with little or no consideration given to the future requirements. While it is true that immediate needs can often fully justify the purchase of a microcomputer, this approach often leads to an inefficient ability to meet future demands.

The issues of microcomputer capability, compatibility and the portability of applications have been receiving a high degree of attention by the industry and its critics. These issues are particularly important for those businesses and organizations with a current high demand for microcomputers. This high demand can typically result in the aquisition of a multitude of different and incompatible hardware and software. RTI's extensive experience in the use of a wide variety of microcomputer hardware, software and peripherals has shown that these issues should be addressed in assessing present and future needs.

Capability and compatibility of microcomputers vary widely in the industry at present. There are presently over 200 microcomputer manufacturers supported by thousands of software and peripheral vendors. The microcomputer industry is far too new for all of these manufacturers to agree on a similar way of doing things.

In general, there are six components to each microcomputer

configuration that greatly influence the capability and compatibility of these systems: the microprocessor chip, the operating system, the memory, the disk storage size and format, the bus structure and the software.

The microprocessor chip is the "brain" of a microcomputer. At present, there is a vast array of different microprocessor chips in use. While no standards exist, a few popular chips (e.g.. Zilog Z80, Intel 8088) are dominating the market coupled with certain popular operating systems (e.g. Digital Research CP/M, CP/M-86, Microsoft MS-DOS). Basically, an operating system consists of a series of programs designed to supervise overall computer operations in an efficient manner. This includes control of the execution of programs, flow of data, input/output devices and memory management.

Two approaches have been taken by the industry in implementing microcomputer operating systems. Some manufacturers such as Apple and Radio Shack have developed operating systems specifically for their products. As such, all products to run on these machines much be designed specifically for the manufacturers product. Unfortunately, this approach carries a high cost when attempting to transfer software or peripheral products to another type of microcomputer and operating system.

The second approach entails the use of an operating system (and microprocessor) that is used by a large number of other manufacturers. More importantly, these operating systems are well supported, both by their developers, and by the software and peripheral vendors actively developing a large base of high quality products. RTI's experience has shown that Digital Research's CP/M and CP/M-86 operating systems, and Microsoft's MS-DOS operating system are implemented on a wide number of machines, provide an extremely large software base and provide a high degree of similarity and compatibility. As such, users can expect to be able to use similar software on a number of different microcomputers and transfer data between computers without the need for retraining or reprogramming.

The capability of many hardware and software applications is also a funciton of available memory. In general, memory capacity of a machine is directly related to the type of processor utilized. Many configurations, however, are designed such that memory constraints and expansion capability are defined by the overall system design. Today's popular microcomputers can generally be categorized in one of three generations of technology. The 8-bit microcomputers such as the Apple II, Radio Shack Models II and III, Osborne I and Kaypro II are designed utilizing an architecture that generally limits available memory to 64K (approximately 64,000 characters). The next generation of 16-bit computers utilize a design that allows the machine to address considerably more memory (up to 1 Megabyte but typically in the range of 128K to 512K). The IBM PC is perhaps the most popular of these 16-bit micros. The latest generation of 32-bit microcomputers has not yet reached the popularity of the 8-bit or

16-bit machines, primarily due to lack of software support. These new 32-bit machines can feasibly address up to 16 Megabytes of memory and function considerably faster than the earlier generation machines. As the price of memory drops and the quality of software improves, the use of high memory capacity microcomputers will begin to dominate many applications.

While mass storage provides perhaps the highest potential for microcomputer compatibility, the lack of a standard size and format has been disconcerting. For floppy disks, sizes range from under 3 inches to 8 inches. While the 5 1/4 inch and 8 inch sizes have dominated the industry, the sub 5 1/4 sizes appear to be gaining popularity, particularly in the portable computer market. Disk format is even more of a problem. With the exception of the IBM PC and Apple II "look alike" market, very few microcomputer manufacturers use the same disk format. This essentially means that even though two different computers use the same processor, operating system, and disk size, the disks from one will not work in the other.

Equally important to the capability and compatibility of microcomputers is the bus structure. This component of microcomputers (not all micros have them) determines the expansion potential. It is where add-on memory, communications, and printer interface boards are located. Like microcomputer operating systems, the popular ones are beginning to dominate the industry (e.g., S100, IBM-PC bus). The bus structure is an important concern when considering possible future expansions.

While standards may ultimately appear in these critical components of all microcomputers, it will only be as a result of the fierce competition currently facing this industry, and as such, will take time. Given the high demand for improved compatibility among micros, the industry has found innovative ways of circumventing the needs for industry standards.

In general, the problems of compatibility are indirectly being eliminated by the extensive efforts of the software manufacturers. Because of the high demand for quality software, many of the most popular applications software packages and languages are becoming available for a wide variety of microcomputer configurations running compatible operating systems. Packages such as DBASE II, SuperCalc, WordStar, Condor, MDBS, and Microsoft Basic are available for nearly all micros with the capability to run CP/M, MS-DOS or CP/M-86 operating systems. When properly configured, this includes the three leading sales microcomputers: Apple (running CP/M), Radio Shack (running CP/M) and IBM (running MS-DOS or CP/M-86). This compatibility through software insures that, when software is properly selected, the developer of a system designed on one microcomputer can have complete confidence that it can be made to run on many other microcomputers with little or no modification. The question remains, how does one transport a system from one computer to another computer?

The simplest means of achieving portability is through full disk compatibility. But as previously stated, microcomputer disk compatibility, while improving, is still severely constrained. Some hardware manufacturers addressed this problem by releasing "look-alike" computers nearly identical to the industry leaders. There are several manufacturers of microcomputers that are "fully IBM-compatible" or "IBM look-alike". There are several Apple look-alikes as well. For the sake of the users, these terms can usually be interpreted to mean that the computer can "read, write and run" the same disks. This is a big claim that, unfortunately, is not always 100% accurate. In general, however, it does work for many of the popular software packages in that these are the ones most often tested.

Another approach to portability is through the use of communications. Simply stated, this entails the use of two different microcomputers (e.g. an IBM PC and an Apple II+ running CP/M), RS232C communications ports on each, similar communications software on each (e.g.. ASCOM, MOVE-IT), and a cable connecting them (or when distance prohibits direct connection, the use of a modem and telephone connected to each computer). While not as simple as disk compatibility, this approach is a fully proven and reliable means of attaining portability of applications. Using this approach, program source code, database files, encrypted files, spreadsheet files, and standard text files are easily ported from system to system at speeds up to 19200 baud.

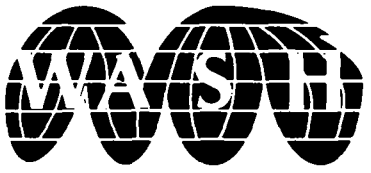
One limitation of this approach is the difficulty in transporting the actual commercial software programs (e.g.DBASE II, SuperCalc, etc..) to a different machine. This fact, however, is to the great relief of the softwar- manufacturers whose copyright licenses legally prohibit such actions. As such, the users must purchase copies of software packages for each of the microcomputers involved.

Another constraint for many users to this approach is that the communications expertise required is not as easy to master as the spreadsheet or wordprocessing software that have made micros so popular. This capability therefore, has typically been relegated to those with the time, expertise, and access to necessary hardware and software to perform these functions.

Similar to the issues of portability are the requirements to transfer data files and reports between mainframes and microcomputers. The ability to down-load (or upload) data between a mainframe or minicomputer and the microcomputer is a process similar to attaining communications between two microcomputers. Typically operated at 300 or 1200 baud over standard telephone lines, a microcomputer is able to send and receive standard text ASCII files (that is, fixed length records each terminated by a standard carriage return/line feed pair). While more complex data files can be transferred, additional processing may be required depending upon the application. RTI has extensive experience in the sharing of data between a wide

variety of microcomputers and several different larger computers. Successful data transfers have utilized such large computers as the IBM 3081, IBM 370/165, Amdahl 470 V/7 and VAX 11/750.

Given the tremendous growth of this industry and its impact across all facets of data processing, information management and daily office operations, it is obvious to see the potential benefit of foresite in planning the acquisition and application of today's microcomputers.


WASD