PD-ABA-143

ISN 85151

INNOVATIVE APPROACHES TO COOPERATIVE MANAGEMENT, FINANCE AND TRADE

Final Project Report

Cooperative Initiative Grant
Cooperative Agreement OTR-0192-1-00-8241-00

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July 30, 1992

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I. Introduction

In accordance with Sections F.2.a and F.2.c of the schedule of the referenced Cooperative Agreement, we provide this Final Report.

A. Review of Project Purpose and Objectives

The purpose of the project is to assist developing country cooperatives, credit institutions and the institutions that serve them to share in the benefits associated with the use of computer technology. This includes the traditional efficiencies in record keeping and management decision processes but with additional emphasis on international communication for data acquisition, technical assistance, and trade relations as well as promoting in-country user-groups and bulletin boards. The broader objective of the project is to deliver technical assistance in the areas of management, finance and trade on a smaller scale, to a broader audience, on a continuous basis at a lower per unit cost than the traditional, (i.e. long term, on site) means of delivery allow.

As with any innovative project, there have been some obstacles to overcome. However, these have not prevented substantial achievements of the objectives of the IAP project. All in all, the IAP project has produced results above and beyond our initial expectations.

B. Overview

In project Year I, activity began in July 1988 with the initiation of the IAP Advisory Electronic Conference. Four of the five "country feasibility studies" were completed in Costa Rica, Honduras, Indonesia and the Philippines. Current with the work on the feasibility studies, a survey was performed to review relevant electronic information database services available in the United States. Lastly, the first of the IAP's computer and telecommunications training course was held in Costa Rica for 12 cooperative computer and financial administrators.

In Year II, the final country feasibility study for Egypt was conducted and finished. The Advisors Conference, which operated during Project Years I and II was adjourned as of June 1990. Computer and telecommunications training courses were completed in the remaining four target countries; Honduras, Egypt, the Philippines and Indonesia. In all, over 100 cooperatives from the five countries have participated in the IAP training component. The IAP program originally planned for 18 training participants.

Electronic mail and conference accounts were provided by the IAP project to 17 participating cooperatives in Honduras, Egypt, Costa Rica, Indonesia and the Philippines. In January 1989, these cooperatives joined the IAP Advisory Committee Conference, effectively expanding and changing its role from "advisory" to a globally accessed, cross-cultural,

educational and information sharing tool called the "Cooperative Development Conference" (CDC).

The IAP "Cooperative Computer Software Survey" conducted by the Wisconsin Cooperative Development Council, was completed in June. Fifty-three cooperatives around the United States participated in the survey. The aim of the survey is to identify existing agricultural and cooperative-related software packages which could be beneficial to growth and sustainability of cooperatives in developing countries.

In Year III, The Innovative Approaches to Cooperative Management, Finance and Trade project was completed December 31, 1991. IAP was scheduled to be completed on June 30, 1991. Because project communication costs were lower than anticipated, the IAP staff reported to USAID at the Year II review that the project was looking to reprogram those funds in other project initiatives. These projects include an electronic communications network using shortwave radio technology among the cooperative rural banks (CRB) in the Philippines and proposal development for an African based information and communication network to support African research and development. As these activities were still being developed in June 1991 a six month no-cost extension was requested to continue project development. The no-cost extension was granted by USAID.

C. Final Project Activities Included:

Completion of the "Computer Guide for Cooperative and Agribusiness Managers", a handbook intended for cooperative managers who have little or no experience with computers but who would like to use them to increase their organization's efficiency.

An analysis of market and trade information sources in Hungary and the current infrastructure on the local telecommunications industry. The results of this analysis will be used to help promote greater import and export potential for the privatizing agribusinesses.

Based on the successful introduction of ACDI donated computers, ACDI performed a Communications Needs and Network Design Analysis in mid-1991 which led to ACDI setting up a Pilot Voice and Packet Radio System for cooperative and agribusiness development in Mindanao. The communications system was jointly funded by ACDI and the local coops represented by the Philippines Federation of Cooperative Rural Banks. In December 1991 the packet radio system became operational.

The IAP "Model Feasibility Study" was completed in the fall of 1991. The "Model Feasibility Study" is intended to serve as a guide for organizations to use in evaluating the cooperative sector prior to the implementation of a project with a computer and communications technology component.

The "Computer Guide for Cooperative and Agribusiness Managers" was completed in November and published in December 1991. The "guide" is intended for cooperative

managers with little or no experience with computer technology. It gives the manager a basic overview of what computers are and how they work, how computers are used in management information system, and how to incorporate computer technology into their cooperative organization.

D. Detailed Description of Expected and Actual Project Outputs

The following is the final report of the activities by Agricultural Cooperative Development International on Innovative Approaches to Cooperative Management, Finance and Trade Project (OTR-0192-1-00-8241-00). This report covers activities during the project period July 1988 through December 1991.

The IAP project had originally planned to conduct its activities in six countries; Indonesia, Egypt, Costa Rica, the Philippines and Guatemala. Guatemala was eliminated from the project based on recommendations from the Guatemala AID mission. The mission felt that "due to institutional problems, it was premature to explore computer and telecommunication uses in the cooperative sector." With the approval of AID/Washington, the capital allocated for Guatemala was redistributed among the other programs to help improve IAP's efforts in the other five countries.

II. Accomplishment of Objectives

The Innovative Approaches to Cooperative Management, Finance and Trade Project has met all proposed objectives, which are:

- The IAP Advisory Committee;
- Five Country Feasibility Studies;
- Computer and Communications Training;
- International Electronic Conference;
- The "Computer Guide for Cooperative and Agribusiness Managers";
- A Survey of US Cooperatives use of computer technology and Management Information resources;
- Proposals drafted based on 'lessons learned'...;
- A Model Feasibility Guide; and
- A Survey of current and relevant information databases.

A. A summary of each objective follows:

1. The IAP Advisory Committee

In early July 1988 IAP established four advisory committees of four to six individuals to provide guidance in each of the following areas: Computer-Based Training, Computer-Based Communications and Information Retrieval, Computer Systems and Software, and Agricultural Trade. The Advisors met in Washington D.C. for a two day conference to learn

to use the EIES, an electronic communications network. The Advisors Conference was hosted on the network so that the Advisors, based around the world would have a centralized forum for communication and guidance to the IAP staff.

The concept and use of an electronic, multi-disciplinary advisory conference for project support was invaluable in successfully administering and managing the Innovative Approaches Project. The Advisory Committees' expert guidance and advice proved invaluable to the project. We were able to call on them to assist us in project planning, provide us with additional information and resources that we would not likely have located.

One Advisor wrote that "the truly innovative aspect of this project...was the effort to use an entirely new communications structure in the administration of the project". Another advisor wrote that "Innovative Approaches Project created a structure that made it possible for experts from a wide range of fields to make substantive contributions to the project in a timely manner."

The Advisors Conference, which operated during Years I & II was adjourned as of June 1990.

2. Five Country Feasibility Studies

Feasibility Studies were a major project component in year I. Studies of four weeks duration were undertaken in five countries by two teams of three members each. The countries; Indonesia, Egypt, Costa Rica, Honduras and the Philippines, were selected using three criteria: in-country availability of access to low cost, international computer communication networks (packet switching); designation as a cooperative development priority country by The U.S. Agency for International Development Office of Private and Voluntary Cooperation, and; deemed by ACDI Regional Vice Presidents as target countries for further business development, particularly with cooperative trade development in mind.

The Team members were selected from the following three specialty areas: Cooperative Management and Training, Trade and Finance, and Computers and Communications. The Feasibility Study Reports include a detailed analysis of each sector and concludes with the team members recommendations on areas in which IAP efforts should concentrate.

3. Computer and Communications Training

Originally it was proposed that NDPL would conduct the Computer and Telecommunications training for the Innovative Approaches project in the United States. However, NDPL was dissolved in the early stages of the project. This required ACDI to reprogram the Innovative Training module. With the approval of AID, the computer and telecommunications training course were developed and held in-country. By January 1990, training courses had been completed in each of designated countries. Consequently, the cost per student was lower than expected, the quality of training raised and the number of cooperatives able to participate in

the IAP project increased substantially. In all, personnel from over 100 cooperatives participated in these courses, significantly more than the 18 participants originally proposed.

The following curriculum elements were proposed as guidelines for each training program:

- Introduction to Microcomputers including Hardware Maintenance and Microcomputer Operating Systems
- Introduction to Word Processing
- Introduction to Spreadsheets concentrating on Cooperative Financial Applications
- Introduction to Database Management concentrating on Finance and Management Applications
- Introduction to electronic communications

Each country training consultant then tailored the courses around the needs of the participating cooperatives.

Training evaluations from participating countries have indicated that this was considered one of the most essential aspects of the IAP project.

4. International Cooperative Development Conference

In January 1990, IAP started the Cooperative Development Conference. The Conference was hosted on the EIES network and comprised 15 cooperatives and supporting institutions and 15 experts in the fields of training, computers, trade, finance and communications. The participating organizations are in Costa Rica, Honduras, Egypt, Indonesia and the Philippines.

The purpose of the Conference was twofold. First, to demonstrate the usefulness of telecommunications in applications such as technical assistance, information resource retrieval, distance education, accounting and trade. The second, was to encourage discussion about applications for new information and computer technologies in agribusiness in developing countries.

5. The Computer Guide

The Managers Handbook was completed in November and published in December, 1991. The handbook is currently available for distribution. The handbook is intended to provide small agribusiness managers with an understanding of the concepts and use of computers and other communication technologies to increase organizational efficiency.

6. Software Survey

IAP engaged the Wisconsin Cooperative Development Council to conduct the survey of

cooperatives use of computer software. The goal of the survey is to identify existing relevant agricultural and cooperative software packages used in the United States that could be used or adapted to cooperatives in developing countries.

Fifty-three cooperatives participated in the survey. They varied in size and type from local cooperatives with $125,000 in annual sales to regional marketing and supply cooperatives with more than $2 billion in annual sales. Computer systems varied by type and size of cooperative; local cooperatives using mostly PC networks or minicomputers; and regional coops using mainframe systems.

The first point to notice about the information gathered by the survey was the intensive use of information management technologies by the surveyed cooperatives. Fifty-one of the surveyed cooperatives (96%) reported using accounting software. Forty-two percent of the local cooperatives used off-the-shelf software and another 52% used modified software. In contrast, 100% of the regional cooperatives and 71% of the marketing cooperatives used customized software. In all, the study obtained information on 19 "brand name" accounting packages, of which four were recommended for possible use by cooperatives in lesser developed countries.

Twenty-three cooperatives reported using operational software, usually related to feed rationing and fertilizer mixing. Of the operational software packages reviewed, nearly half were developed in-house by regional cooperatives for use by their affiliated cooperatives.

The survey also investigated the use of electronic information services by cooperatives. It was found that 66% of the cooperatives use Fax. 34% reported using public information Service providers for E/Mail and database access for credit and market information.

Descriptions of the software used by cooperatives are included in the Survey's appendices. Also included is public domain software that covers a wide range of applications, these include: market charting, fruit and vegetable operations, beef feedlots, crop storage, grain elevator, dial up agricultural services and other agribusiness software.

7. Proposals Drafted Based on "Lessons Learned"

a. Cooperative Information Resource Center - The Philippines

IAP project personnel began developing a follow-on proposal in 1989 to establish a "Cooperative Information Resource Center" in the Philippines. Project feasibility studies have all recommended a center for accumulating and disseminating general information to a country's cooperatives on computerizing and increasing their competitive edge in the local and international market. The Philippines was planned as the pilot project to demonstrate the utility of such a resource. The proposal was submitted to the Kellogg Foundation for funding and funding was declined.

b. Market Information and Development Center - Poland

The goal of this proposed project was to enhance private sector development for Polish agricultural and food industries. In December 1989, ACDI and Volunteers in Overseas Cooperative Assistance (VOCA) concluded a mission to Poland analyzing development requirements for agriculture, agribusiness and cooperatives.

To respond to the lack of market information and to insure a coordinated development effort in Poland, ACDI proposed that two things are required: (1) the formation of a Market Information and Development Center (MID) in Warsaw, and; (2) a Development Roundtable of parties interested in development projects in Poland.

The Market Information and Development Center (MID) would provide training courses on business basics needed in a free market economy such as: market and business analysis, financial planning and budgeting, proposal writing, and others. The MID center would also assist Polish agribusiness entrepreneurs develop business proposals to attract U.S. investors. Promising business opportunities developed through the MID would receive wide consideration by Polish and U.S. businesses through contacts developed at Development Roundtables. Business specialists at MID and the U.S.-based program coordinator would nurture and assist developing business arrangements achieve their full capabilities.

A prestigious Polish-U.S. Development Roundtable would be established to bring private sector businesses and public policy makers together to promote increased U.S. investment in Polish agriculture and associated industries. The roundtable would highlight opportunities for joint business arrangements, orient business leaders and policy makers on the business climate for joint ventures, investments, and trade, and introduce each to important leaders in the other country.

The Market Information and Development Center proposal was submitted to USAID for partial funding and was rejected.

c. AfricaNet

The objective of this pilot communications project was to facilitate regional education programs using computer communications technology to be funded by Digital Corporation. A preliminary analysis, to determine the interest of local counterparts in southern Africa in participating in participating in this proposed project, was conducted by ACDI, Digital Corporation, University of Southern California and the U.S. National Academy of Sciences (BOSTID) in August of 1991. ACDI's travel expenses were funded by BOSTID.

The team found that local interest in such a project was very high, but the joint effort amongst the teams organizations fell apart when Digital continued to postpone financial commitment.

ACDI determined that funds allocated for AfricaNet would be better used in research and analysis of upcoming projects in Eastern Europe, particularly Hungary.

d. Project Development - Philippine Radio Packet Project

Because USAID granted ACDI the no-cost extension to the IAP project, IAP was able to develop and implement a pilot project called Cooperative Rural Bank Packet Radio Network System in Davao and Tagum cities in Mindanao, Philippines.

The objective of this innovative project was two-fold:

(1). To install a pilot, two-node computer-radio system that would allow for reliable voice and data transmissions using VHF Radios linked to computers, and;

(2). To provide a report on the Business Applications, Strategies and Action Plan For the Voice/Data Communication Network (Appendix D).

The successful design and installation of the Voice/Data Communications system was a very ambitious undertaking considering the limited funds, allotted time, and limited practical experience of the local Filipinos in Radio Packet Switching technology. The Voice/Data Communications Network went live in late December 1991.

This pilot project is a direct result of the IAP computer training and computer donation to the Mindanao Cooperative Rural Bank. Within two years of the computer training and the donation of a PC, the CRB in Davao expanded their automation efforts from the PC to a distributed network with eight nodes. This system is used to process savings and loan accounts and produce 'Trend Reports' for the management. The CRB in Tagum, based on the Davao CRB success in computer automation, replicated the same computer network in their office. The need for timely and accurate 'Funds Transfer' between the two CRBs was the reason for the establishment of the Voice/Data Network.

Based on the success of this pilot project, the Federation of Cooperative Rural Banks plans on installing several more systems in the next 1 to 2 years. Once fully operational, the cooperative sector in Mindinao will have the only 'island wide' communications system.

e. Analysis on Hungary's Market Information Resources

In November, 1991, ACDI completed a review of the agricultural sector which identified needs for improving the marketing efficiency of the Hungarian agricultural industry. Within that review, ACDI identified a critical lack of market information available for use by marketing managers. Quoting from the ACDI report...

> "Because of the lack of market information currently available in Hungary, it is difficult to provide a detailed list of each item, quality/quantity of processed food products,

specific potential markets for each item, estimated market value, etc. It is felt the information exists, but it is held in a variety of locations and our impression was that it is not used by decision makers."

In December, 1991, IAP sponsored a two member team to perform a detailed analysis to assess the market information system currently being used in Hungary and to make recommendations for changes that may lead to improvements in marketing Hungarian agricultural products, both domestically and internationally.

ACDI is in the process of initiating two projects in Hungary to assist agribusiness development. It is likely that this subject of market information systems will be revisited at a later time in the context of these projects.

f. Post-IAP Project Activities

ACDI Senior Vice President of Projects, Donald Crane, addressed a group of 80 middle managers from the Agency for International Development who participated in a workshop on electronic networking sponsored by the Center for Development Information and Evaluation. He challenged the audience to share information resources with the Third World, saying:

"If the industrialized nations are unwilling to share the resources of the Information Age of if the developing world fails to recognize the importance of information resources, there is danger that the development gap will widen. On the other hand, new information resources are relatively cheap, rapidly transportable, and difficult to hord. Thus, if the developing world recognizes the opportunities available to it in the Information Age, the gap can be narrowed considerably."

This presentation was given in 1989. Four years later, after the lessons learned from managing the IAP project, ACDI is more committed than ever to continue its efforts in introducing automation technologies and making available information resources worldwide to developing countries. As such, whenever feasible, ACDI incorporates automation and information resource access into their on-going and future development efforts.

g. Summarization of Problems Encountered: Training Scope and Allocated Time Changed

The results of the country feasibility studies indicated that the computer training courses would be more effective if modified to each country's specific needs and held in-country. This assumption has proved to be true. Initially, 18 cooperative personnel were to be selected for training. With the completion of the last training program, IAP trained more than 100 cooperative personnel in various aspects of computer technology. Although each course taught similar fundamental computer skills, each training program had a different focus for the applied sections. This was required because each country is at different stages in its computerization plans. This increased the courses value to each country's participants.

However, the original IAP project called for about three months of training activities in the U.S.A. Under the revised plan, the training component took almost a full year to complete. This was mainly due to the logistics of hiring training consultants, locating training facilities and the coordination with other development projects where required. This delay did not have a negative impact on the IAP project's timeline.

IAP training was enhanced by in-kind contributions from the local participating cooperatives, other development projects and government ministries. In Indonesia, the Department of Cooperatives donated US $11,500.00 to expand the training in their country. In the Philippines, the participating cooperatives donated software and human resources, valued at $18,884. In Egypt, human resources, software and training facilities valued at $52,507.00 was donated. In Honduras, IAP worked with another AID project, Small Farmer Organization Strengthening Project (SFOSP). SFOSP personnel's time was donated to IAP to better coordinate these two project's goals. SFOSP time has been valued at $21,091.00. In Costa Rica, the participating cooperatives contributed software and human resources, valued at $15,909.00.

h. Guatemala Withdraws From The Project

Withdrawing Guatemala from the project was based on recommendations from the Guatemala AID mission. The mission felt that "do to internal institutional problems, it was premature to explore computer and telecommunication uses in the cooperative sector." With the approval of AID/Washington, the capital allocated for Guatemala is being redistributed among the other programs to help improve IAP's efforts in the other five countries.

i. In-Kind Contributions Not Realized

CBC, which had planed to commit in-kind contributions of nn dollars to the project, underwent a major reorganization and staff consolidation effecting the International Department, rendering them unable to contribute human resources to the project in years II and III. CBC's total contributions were ??????????????????????? $nn (331,000)

National Council of Farmers Cooperatives had contributed office space to the project during year I, but required the office space for it's own purposes during years II and III. NCFC's total contributions were ??????????????????????? $nn (25,851)

However, substantial contributions by the cooperatives participating in the in-country computer training and U.S. cooperatives participating in the software survey largely offset reduced contribution elsewhere.

j. Increased Travel Budget

The original concept of providing Technical Assistance faster and at a lower cost than

traditional means via data communications networks, project monitoring would be greatly enhanced with a slightly larger travel budget.

III. Impact

The most significant accomplishments of the IAP project are simply put:

- the increased number of cooperatives participating in the IAP Computer Training courses;
- the successful design and installation of the Mindinao Voice/Data communication network for Cooperative Rural Banks;
- the design and production of the "Computer Guide for Cooperative and Agribusiness Managers"; and
- the recognition that the development of regionally based Market Information Centers, to provide timely and cost effective information on the cost and availability of domestic and international markets would provide the cooperative sector the edge they need to successfully compete in the international market.

A. Lessons Learned

The insights gained in managing the IAP project were numerous and are to many to list in detail. Cooperated in future ACDI endeavors. The overriding lesson learned in implementing an innovative project such as IAP, is that you must be very flexible and creative in implementing the project. The learning process was continual and the experiences gained were continually examined to determine if the original project plan required modifications.

The best example of 'lessons' learned' is the implementation of the Computer Training. Computer Training was to be held in United States by an organization called NDPL which dissolved before they could implement the training. NDPL being dissolved was at first perceive as a disaster, but consequently it resulted in much better training program held in five countries with over five times the participants originally planned for. The lesson learned was that computer training is less expensive and better received if the training is conducted as close to a participants home as possible.

Another good example of "lessons learned" is a fairly common one in development projects, but hits home closer and harder when implementing innovative projects such as IAP. That lesson is, just because we think a certain country or group is ready for automation technology and information systems does not make it so. Guatemala is a perfect example of this.

B. Impact on ACDI's Development Efforts

ACDI's success in the development sector is based on its ability to adapt lessons learned

from all of its past and current projects in the design and management of future projects. The IAP project is a good example of this strategy. The IAP project was conceived and designed based on ACDI's prior project management experience that automation and information technologies can play a significant role in reducing the development gap.

IV. Budget Analysis

Budget Summary

JUNE 88' - DECEMBER 91'

I. GRANT BUDGET	BUDGET AMOUNT	ACTUAL EXPENDITURE
1. Salaries	$63,050.00	$78,936.00
2. Payroll Added	$13,871.00	$31,978.00
3. Consultants	$181,440.00	$207,941.00
4. Training	$134,101.00	$150,745.00
5. Other Direct Costs	$24,862.00	$24,109.00
6. SUBTOTAL	$417,324.00	$493,709.00
7. Indirect Costs	$150,236.00	$156,291.00
8. Subcontract	$82,440.00	$0.00
9. TOTAL GRANT BUDGET	$650,000.00	$650,000.00
II. OTHER FUNDING		
1. ACDI core grant	$218,883.00	$228,417.00
2. ACDI Development Fund	$50,910.00	$49,063.00
3. CBC	$331,000.00	$100,000.00
4. NCFC	$25,851.00	$8,200.00
5. Other Contributions	$91,843.00	$172,865.00
6. SUBTOTAL	$718,487.00	$558,545.00
III. TOTAL PROJECT VALUE	$1,368,487.00	$1,208,545.00

A. Budget

Variances of 5 percent between the latest approved budget and actual expenditures are due, in a large part, to NDPL not participating in the project. This required ACDI to take a greater part in the management, design and implementation of the IAP computer and telecommunication training component. Given certain outstanding circumstances concerning NDPL, and with the approval of USAID, the IAP I.8 Subcontract line item was reprogrammed to line items I.1 Salaries, I.2 Payroll Added, I.3 Consultants and I.4 Training. The end result of this was that the computer and telecommunications courses were held in-country. By holding the courses in-country, IAP was able to lower the 'cost per participant'. This enabled IAP to provide specialized training to over 100 cooperatives rather than the envisioned 18.

Other impacts of plus/minus 5 percent were in line items II.3 CBC, II.4 NCFC and II.5 Other Contributions (NDPL). CBC underwent a major reorganization and staff consolidation effecting the international department, rendering them unable to support the project with donated staff in Years II and III as they had in Year I. NCFC had contributed office space to the project during Year I, but during Year II and III required the space for it's own purposes and finally, NDPL's lack of participation impacted the II.5 Other Contributions (NDPL) line item, however, substantial contributions to in-country training offset this.

Appendix A

Model Feasibility

Appendix A

Model Feasibility

I. Background

For over twenty years Agricultural Cooperative Development International (ACDI) has been providing technical assistance to cooperatives in developing countries. It is from this experience that ACDI has recognized the growing importance of computers and computer-based communication technologies to the development of the cooperative sector. These technologies include: community specific computer networks, databases, on-line library and expert advisory services, communication networks that permit the rapid sharing of information over wide distances; and increasingly affordable computers to process, present and store information.

Using these relatively low cost technologies as tools, many could benefit: from the small farmer at the micro level, to the cooperatives and credit institutions and the communities they serve, and finally to the developing country itself.

In June of 1988, ACDI began work on the Innovative Approaches to Cooperative Management, Finance and Trade project (IAP). The purpose of the project was to provide technical assistance in the form of computers and computer-based communication technologies to developing country cooperatives and credit institutions, as well as the organizations that serve them. The emphasis would be not only the basic automated record keeping but an additional emphasis on international communication for data acquisition, technical assistance, and training in the areas of management, finance and trade.

ACDI's first objective with the IAP project was to conduct country feasibility studies. The project proposal suggested studies of four weeks duration be undertaken in six countries by two teams of three members each. Five countries were ultimately chosen for the feasibility studies. The countries were selected using three criteria:

- In country availability of access to low cost, international computer communication networks (packet switching);
- Designation as a cooperative development priority country the U.S. Agency for International Development Office of Private and Voluntary Cooperation;
- Deemed by ACDI regional Vice-Presidents as target countries for further business development, particularly with cooperative trade development in mind.

The countries selected based on the above criteria were: Egypt, Indonesia, Philippines, Costa Rica, and Honduras. ACDI has a regional representative in three of the selected countries (Egypt, Philippines, and Costa Rica) and on-going projects in three of the countries (Egypt,

Costa Rica, and Honduras).

Pre-implementation feasibility studies are critical to a successful project. When the larger goal is to bring about social and economic development, each project will have a wider impact than the initial focus. Similarly, any project will be affected by activities outside the intended scope of the project.

This is especially true with the IAP project. The focus of the project itself was computer and communications technology, but the feasibility studies were both a sectoral study of cooperatives in each country and a study of the potential usefulness of computers to cooperatives. The sectoral study provided a look at the internal and external environments of the organizations involved. Computers and computer based communication are only tools to be used by the organization. Sometimes changes have to be made in the internal and external environments of the organizations before these new technologies can be useful or efficient. The emphasis throughout the life of the project was that computers cannot be "the answer", but merely a tool to be integrated and utilized by the cooperatives and credit institutions.

In order to conduct the sectoral study, ACDI looked at cooperatives and their financial institutions at the national, regional, and local levels. Those governmental agencies with promotional, support or regulatory responsibilities for cooperatives were studied as well. In each case, the approach was to gather information on the state of management, financial and trade activities of the cooperatives, as well as the environment in which they exist.

By January 1990, studies had been completed for Egypt, Honduras, Costa Rica, Indonesia and the Philippines. These studies provided ACDI with the critical information it needed on the cooperative sectors, cooperative institutions, and government agencies and programs in each of these countries to successfully implement the IAP project.

The following model feasibility study is the concluding report in the series of country feasibility studies produced by the IAP project. It is intended to serve as a guide for other organizations to use in evaluating the cooperative sector prior to the implementation of a project.

II. Personnel

It is recommended that the Feasibility Study Team be composed of individuals with extensive overseas and professional experience in the following areas:

- Cooperative management and training
- Trade and finance
- Computer and communications
- Telecommunications

Depending upon budget and personnel considerations, the duties of the Computer and

Communications Specialist and the Telecommunications Specialist may be performed by one person.

Because of the focus of the study, it is recommended that the Team Leader be the Cooperative Management and Training Specialist.

Scopes of work for the three positions are included in Appendix A.

III. Limitations of the Study

It is always ambitious to attempt to include many site visits for maximum data collection in a relatively short period of time. Such "quick and dirty" data collection is limited by cost, time, and language constraints. It is difficult to track the dynamic nature of computer and computer based communication technologies as well. Regardless of the number of site visits made by the study team, it is impossible for the team to identify and adequately address all the needs of the cooperative sector. However, a sufficiently comprehensive feasibility study can be accomplished.

Initially, the team much decide how much of the work to be done will require the entire team and what can be accomplished independently by the individual team members. This balancing act may need to be fine tuned as the study progresses. If data exists for each of the specialists at a particular site, then obviously the whole team should visit that site. However, it is not necessary for the team to conduct their research together all of the time. This saves both time and money. If there are language constraints, it is optimal to have the questionnaire translated prior to the site visits. It is important to plan ahead so that the interpreter(s)'s time is used efficiently. Collaboration with local institutions can be of great assistance. Some of the research needed may already be compiled (i.e., financial statements and annual reports) and should be collected and utilized.

It is critical to recognize the limitations of such a study prior to its onset. Data collection of this type is always limited by time, cost, and language constraints, as well as the dynamic nature of the technology being studied. Careful planning prior to the study can lessen the negative impact of these limitations. Also, periodic team meetings need to be held to make adjustments in schedules and objectives. Flexibility is of vital importance. Only so much planning and preparation can be done. A successful feasibility study requires team specialists who are able to adapt and adjust to unanticipated circumstances. Thus, one of the best remedies to lessen the negative impact of these limitations is the careful prior selection of the study team.

IV. Feasibility Study Structure

A. Methodology

Prior to departure, the study team should gather background information on organizations

and compile a list of individuals and organizations to contact in-country. The country's embassy as well as USAID can be helpful in this initial background research. It is important to identify cooperative community leaders at this point as well. If the study team has contacts in-country through their respective organizations, these should be utilized. If not, they should ask for assistance from other organizations in the U.S. who have overseas staffs.

Ideally, the team should hold a pre-departure meeting. Since this is not always possible, the first days in-country may need to be spent in team meetings. Initially, the team needs to share any background research they may have conducted individually. It is necessary at this point to develop institutional profiles, which includes basic questions on the status of each organization; and a questionnaire, an opinion survey on the issues involved in the study. A draft final report outline should also be developed, based on guidelines provided by the supporting institution.

It is essential to make appointments in advance of trip for visiting in-country contacts. The team should become acquainted with national cooperative and government leaders. The local USAID mission should be visited. The rest of work is comprised primarily of field trips, with the team specialists returning on occasion to a central location to document visits, confer with team and other advisors, and make/confirm future appointments. The team must decide, given order of appointments, when it is necessary for the entire team to work together and when it is required for the team to split in order for each member to cover his/her own agenda.

In each site visited by the team, the team leader should ask the institutional profile and questionnaire questions. Afterwards, each team member can ask questions relevant to their respective area of expertise. In addition to the interviews, annual reports, copies of financial statements, and other informational materials should be collected to further build the institutional profiles. At this point, according to the team's judgement, attempts should be made to demonstrate communication technology applications.

Toward the conclusion of the team's visit, responsibilities for different sections of the final report should be divided among the team members. Members should be encouraged to contribute to findings and recommendations in all areas.

Finally, the team should leave time for a debriefing with the USAID mission and any national cooperative or governmental institution which the team feels would benefit from such a debriefing.

B. Questionnaire

The questionnaire is a device for the study team to structure its conversations with cooperative organizations, to solicit opinions on a wide range of topics, and to conveniently record the results of discussions. The ACDI teams were interested in learning about areas for information technology applications. Obviously, it is essential to consider the focus of the

study team's investigations before drafting the questionnaire.

The questionnaires used by the ACDI study teams consisted of five sections: Basic Information; Management; Finance; Trade; Training; Computers. In the sample questionnaire in Annex B, we've added questions in the area of Accounting and Communications.

The size of the questionnaire depends upon the judgement of the study team. In the five studies conducted by ACDI, one asked only a few questions in each category. In other cases, the size varied from a few questions up to a page of questions in each category.

Because of time constraints and language differences, do not expect to always be able to complete the questionnaire in its entirety.

Finally, because site visits and chosen cooperatives and institutions are not randomly selected, the responses to the questionnaire do not have any statistical significance.

The results of the questionnaire proved most valuable to members who had specific information needs to gather, such as computer/accounting applications and telecommunications usage. Qualifying the cooperative management practices was a less straightforward process, requiring more discussion with management. Questions tracing management information flows were especially useful in directing these informal discussions. The questionnaire had already identified general data on type of cooperative, cooperative activities, and marketing environment.

Thus, the results of the questionnaire had ultimate value to ACDI after project implementation was initiated.

C. Questionnaire Content

The content of the questionnaire will differ from study team to study team, as well as by organization and country. There are some basic framework issues to be addressed which will be common to most studies:

1. Institutional Profile/Basic Information

This information helps in classifying and grouping interviewees. The study team is most concerned with basics: type of organization, mission/principle activities, type of members, size of organization, and resource base.

2. Management

Because of our technological focus, our interest is with the management structure, decision making tree, flow of communications.

3. Training

The study team is most interested in learning about the adaptability of an organization to technology change by looking at its staff training programs.

4. Finance

The general financial status of the organization and its financing foundation are of primary interest. The level of computerization of the accounting department is critical to know as well.

5. Trade

This information includes the import/export portfolio of the organization, as well as its local marketing and supply distribution methods. It is also important to note the source of market information for the organization.

6. Computers

The kind of system automatization that the organization is using is of critical importance. This includes details about system hardware and software, technical support, and report production.

7. Information/Communication

This information includes the kind of communication the organization uses, as well as the costs involved. It is also important to note the level of telecommunications support in-country.

D. Study Content

The results of the questionnaire and the independent studies of the individual team members determines the study content. The first section is a review of the cooperative organizations, their supporting institutions, and member owned associations within the country. The second section deals with the findings of the team in the four areas of investigation: Banking and Finance, Trade, Management and Training, and Computers and Communications. Finally, the study concludes with two sections: Recommendations and in-country and follow-on activities. These last two sections will provide direction to the sponsoring organization, as well as the local cooperative and ministry administration.

E. Review of Cooperative Organizations and Supporting Institutions

1. Cooperative Sector

This section should be an overview of the national cooperative sector. This includes its composition, political structure, economic contributions to the country, laws, and special features. A brief history of cooperative sector in the country should be included as well.

2. Cooperative Institutions

If possible, a schematic drawing of the cooperative sector showing the relationships between organizations, associations, and cooperative groupings is useful. The remainder of this section should be a brief presentation of the key policy, banking, and trade institutions; as well as other institutions critical to the focus of the study. The level of detail of each brief will vary according to the importance of the institution to the study.

3. Government Agencies and Programs

Again a diagram relating the government agencies and/or programs to the various elements of the cooperative sector is useful. The remainder of the section will follow a structure similar to that of the previous section, with the length of the brief proportional to the agency or program's importance to the study focus.

F. Team Findings

In this section the various teams members report on their independent studies and findings.

For example, one finding of the Honduras Survey in the area of banking and finance was that "a severe foreign exchange shortage has resulted in fewer borrowing options and higher costs of finance. Agricultural commercial credit to cooperatives is extremely limited."

In another case, in the Indonesian Survey reporting on the area of management, it was found that the promotion of cooperatives is mandated in Indonesia's constitution. The level of government involvement in cooperative organization and support has forced managers to focus on government programs and ignore the needs of their members. The most successful cooperatives were those involved in business activities outside of the government programs."

G. Recommendations

In this section the team members should report their recommendations based on their individual areas of expertise and as a group in cases where the finding areas overlap.

The Honduran Survey recommended, in the above instance of poor credit for agriculture, that "either a new production credit deliver mechanism should be put in place or cooperatives should receive significant technical assistance in administering credit services."

In the Philippines, it was recommended that "the Philippine cooperatives should support and promote the establishment of a National Cooperative Bank in order to ensure a full service

financial intermediary capable of supporting cooperative sector."

In the Egyptian Survey, in the area of trade, it was recommended that "the formation of a purchasing cooperative would bring together a core group that could obtain market expertise, pool orders for quantity discounts, and access credit resources that might not be available on an individual basis."

H. In-Country and Follow-on Activities

Depending upon the focus of the study, there may or may not be in-country activities for the study team to demonstrate. Similarly, there may be activities relating to the in-country activities or the investigations of the study team upon which the team can make recommendations. In the case of the IAP project, telecommunications systems were demonstrated as part of in-country activities. Recommendations were made as to location and composition of future computer and telecommunications training course participants and training locations.

V. Cost & Time

ACDI estimated the average cost of the Feasibility studies to be at about $27,500. This was to cover the costs of three team members. Daily rates ranged from $200-$300/day/person, based on a five day work week for four weeks. The average estimated daily per diem rate was $90/day. Travel expenses varied from country to country. Funds were also estimated for car rental and other in-country transportation costs including air fare (again depending upon the country).

Administration and transportation costs can be minimized through coordination with in-country groups. Also, in the case of the IAP studies, the three study team members were from out-of-country, but local cooperative sector professionals accompanied the team. However, ACDI found that the inclusion of in-country experts on the team would be equally beneficial and reduce the cost of the study in lower person daily rates and lack of transportation costs. Including in-country experts in the study team will depend upon the focus of your study and its requisite requirement for technical expertise on the part of the study team members.

A typical budget may look as follows for a three person team, two at AID maximum daily rate, one in-country consultant at $200/day daily rate, $90 per diem rate (lodging, food and miscellaneous), air fare of $1,500 per person,

Fee Days, 40 days, two members @ $300/day/person based on 5 day/work/wk, 4/wk/study	$ 12,000
Fee Days, 20 days, one member @ $200/day/person based on 5 day/work/wk, 4/wk/study	$ 4,000
Per Diem @ 60 days @ $90/day	$ 5,400
Travel 2 trips @ $1,500	$ 3,000
In-country travel	$ 500
In-country transport/car (car provided for 1/2 study period or 10 days)	$ 500
In-country administration and other expenses (.025% of total)	$ 635
Total	$ 26,035

While not tremendously expensive, the feasibility studies are also not cheap. Once again, depending upon the focus of the study, decisions can be made as to the length of the study. We found, though, that four weeks was just enough time for our purposes. We do not recommend anything less than 14 working days, and that only with extensive pre-travel arrangements.

Finally, in undertaking a study of this dimension, the last word has to be flexibility. Only so much planning and preparation can be done. In the end, it is up to the study team itself to make the necessary adaptations of their schedules to the situation in-country. Ultimately, the best the study team can do is follow the study objectives and go with the situation. This is where selecting the right team members pays off. Their experience can often get them through the shifting of visits and meetings and allow them to make the keen observations and recommendations any organization working overseas requires to successfully implement a project.

ANNEXES

I. Scopes of Work

II. Project Selection Criteria

III. Guide to Electronic Communications

IV. Questionnaire

I. Scopes of Work

A. Team Leader and Cooperative Management and Training Specialist

As Team Leader, you will:

1. Coordinate a narrowly defined needs analysis of cooperatives and their support institutions in the target country. As a whole, the team will identify current needs in the fields of trade, information and communications, and training; then the team will determine the applicability of any of the innovative techniques being explored by this project, particularly alternative financing methods, electronic communications and information, computer-based accounting and computer-based training. Given the 4 week time limitation, it is anticipated that the team will be able to directly assess only four or five preselected cooperatives. Additional information on the cooperative sector as a whole may be derived from various reports and public records and from discussions with national level cooperative institutions.

2. Coordinate in-country travel, within the amount budgeted; any potential exceeding of the set amount must be previously discussed with the project manager.

3. Integrate the findings of each team member into a single report.

B. Cooperative Management and Training Specialist

As Cooperative Management and Training Specialist you will:

1. At each cooperative, discuss the project with the coop manager, several board members and other staff significantly involved in daily operations;

2. Ask manager and staff about their information needs, what type of information do they use, what type of information they could use if it were available (e.g., information to help with marketing, exports, purchasing, finances, improved production or processing, etc...);

3. Discover what, if any, training programs are conducted by the cooperative for members and/or staff;

4. Discover what, if any, training programs are offered to the cooperative by government ministries or other institutions;

5. Find out the status of the cooperatives membership: how many members are there; has membership been steady, expanding, or declining; what is the number of people employed by the coop and has this number changed overtime;

6. Determine what the duties of the various coop employees are;

7. Discover what the coop's primary activities and principal products are;

8. Find out whether the coop communicates with other similar cooperatives in the country and if so, by what means.

9. Determine whether the coop has had contacts with cooperatives in other countries, whether it is interested in communicating with cooperatives in the United States, and what the opportunities for movement-to-movement activities are;

10. Discover what mechanisms they use for internal and external communications;

11. Find out whether the coop imports or exports products and if so, which products, to and from which countries and via which channels;

12. Find out where the coop's markets are, how they gather market and member information, and whether the development of a regional market information system might be feasible and useful;

13. Determine whether the coop provides credit to its members and if so, to what extent;

14. Discover whether the coop or its membership use credit from outside institutions and if so, from which institutions; whether the coop or its membership could make use of additional credit and, if so, to what extent and for what purposes;

15. Identify type of accounting system the coop uses and what improvements could be made to that system; specifically, how the coop accounts for member purchases of supplies, member deliveries of produce, patronage refunds, member credit extension, etc., what type of financial reporting is required, and how this flows from the accounting system;

16. Determine whether the coop manager understands and uses financial data to control operations and make future plans, and whether the manager prepares an annual budget;

17. Examine the operating history of the coop and assess its financial condition; determine its goals, objectives and long range development plans;

18. Determine the coop's means of keeping records in various management areas;

19. Discover whether the coop uses computers, and if so, for what purposes; determine who actually operates the computer, maintains it and trains users in its

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operation, whether computer parts available locally; find out about the coop's maintenance experience with computers; determine which specific software packages are used, whether the software has been customized to any extent and by whom;

20. If the coop does not use computers, discover whether the staff is familiar with the capabilities of computers and their various applications; whether they have seen a computer operate and whether they are interested in the possibility of computerizing certain aspects of their operations;

21. Discover whether the coop has a candidate to suggest for the hands-on computer course, when that person would be available and would they be able to release that person from their normal duties for a 6 week period; determine how they would be able to arrange for this candidate to share what he/she had learned with others upon their completion of the course, and whether they would be willing to allow this person some time on the job for further self-instruction;

22. Determine the extent to which the cooperative mobilizes member savings;

23. Prepare a detailed draft technical report of your activities prior to departing from Honduras; the outline of this technical report should be agreed to by the feasibility study team, prior to preparation.

C. Trade and Finance Specialist

As Trade and Finance Specialist you will determine:

1. What products marketed by cooperatives are ultimately exported and through what channels.

2. Are there additional items which are good candidates as exportable items?

3. Which imported items are marketed locally by cooperatives and through what channels are they marketed? Which countries are the sources of the imports?

4. Are there opportunities for U.S. or other developing country cooperatives relative to imports?

5. How do cooperatives and other institutions customarily finance imports and exports?

6. What financial institutions and programs exist to assist cooperatives in their supply and marketing activities?

7. Are there opportunities for cooperatives to take advantage of loan funds that may become available through eligible Intermediate Financial Institutions under PL480 Section 108 in the country?

8. What role is being played by monetized funds?

9. Are there any significant barriers to trade in general or specific barriers to cooperative trade?

10. To what extent might additional information improve trade opportunities? Specifically, consider the appropriateness of:

    -training in trade practices and finance whether by traditional courses, computer-based training, or on-line instruction;
    -access to existing on-line services such as market reports on AgriData, Pronet and I.P. Sharp, historical and background information such as available on ITIS, Dialog an others.
    -access to on-line trading posts such as IDECOP (See annex for descriptions of these databases and networks and database vendors
    -an on-line conference for cooperative trade.

D. Computer and Communications Specialist

1. Analysis of software, hardware, communications and training needs and capabilities of cooperatives:

For the coops which are computerized:

-Conduct a general analysis of system hardware and software, current usage patterns, and primary applications;
-Summarize their process of computerization, focussing on the reasons for successes and failures;
-Determine current unmet needs, problems and bottlenecks within their system, particularly as related to training and communication and information;

For the coops which are not currently computerized:

-Conduct a computer needs analysis for internal record-keeping, communication and information, and training, based on findings of other feasibility team members and various cooperative departments;
-Explain what computerization means, and what is required for proper computer implementation;

2. Seminars and demonstrations:

-Conduct an international communications "test" at the selected cooperatives showing how CARINET and other networks work, accessing information the coop might currently need (e.g. coffee prices) or demonstrating a service the coop could use (e.g. telex);
-Conduct a seminar on international networking, database searching, implications for organizations, other services available, and provide a brief description of x.25 data-packet switching, how to budget for computer communications, and how to structure and implement international communications in their organizations, for the selected cooperatives, interested AID missions, the local business community and other interested parties as appropriate;

3. Postal, Telephone and Telegraph:

Meet with local Postal Telephone and Telegraph (PTT) authorities to:

-Conduct a qualitative analysis of the various services local PTTs provide to their customers in terms of technical support, availability and quality of services in rural areas, trouble shooting capabilities, and billing arrangements so that the information can be shared with the individual cooperatives;
-Find out what are the most relevant new services and standards being developed/implemented;
-Find out if there is any error checking at the packet switch or on local lines, what protocols it can handle (just ascii or also modem, etc.), whether modems are regulated, and whether there are any plans for upgrading local or national service (digital, binary transmission, etc.);

4. International Record Carriers:

-Conduct a cost analysis of the various International Record Carriers to determine which is the most cost effective for our project;
-Find out from the local IRC (Telenet or Tymnet) people about problems, regulations and costs of communicating electronically in-country and internationally (300 baud vs. 1200 baud, any local error checking, etc..);

5. Other computer networks:

-Identify and analyze regionally-based computer communication networks to determine the availability, range of services (particularly electronic mail, telex and database access), potential for creating linkages between U.S. systems, and typical clientele;

6. Computer hardware, software, and references:

Meet with the appropriate ministries and private computer service companies to:

-Determine the general availability and basic cost of computer hardware and user support services currently available in-country, with emphasis on availability of repair facilities and availability and types of maintenance agreements;
-Determine the general availability and basic cost of computer software, with emphasis on availability of competent programmers, and languages and applications supported;
-Assess the availability, cost and usefulness of software already available in local-language versions, if any;
-Assess the availability of reference materials and manuals in local languages for software, hardware and programming, particularly books that may be of use for the computer training course. Please provide a list of the most helpful with title, author, publisher and cost;

7. Computer import regulations:

-Find out the regulations and duties regarding the import and export of Personal Computers, such as when 9 PC's would be brought from the US for a computer training course and then taken back out by some of the students to their respective countries; explore the possibility of obtaining a customs waiver for the trainer and participants in the course;

8. Perform other duties as may be assigned by the Team Leader, which are consistent with the overall scope of this assignment;

9. Prepare a detailed draft technical report of your activities prior to departing from the country; the outline of this technical report should be agreed to by the Team Leader, prior to preparation.

II. Selection Criteria

The following criteria, among others, were discussed and agreed upon by team members for the selection of the cooperative organizations that would be studied by the team.

1. Cooperatives must be internationally oriented. They must be engaged or have immediate plans to engage in exports or imports of agricultural commodities (traditional and nontraditional) or provide credit and international financial support to cooperatives.

2. Cooperatives must be using computer equipment and software or must be in the process of acquiring them.

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3. Cooperatives must have relative significance in regards to size, influence or impact on other cooperatives nationwide and have relative importance in the country's economy.

4. Cooperatives must be interested in and willing to provide information to the project and must have a need to communicate with organization in the country or abroad.

III. Guide to Data Communications for Cooperatives

This guide is a generalized version of the country-specific guides found in the annex of each of the feasibility studies. Each of the guides includes information relevant to that country, which includes: the name and address of the telecommunications organization and its networks, list of customer service numbers, and costing information.

To communicate with computers all over the world, all you need are the following items:

- A personal computer (PC)
- A telephone line
- A modem - a device that connects your computer to your telephone line
- Communications software - a program that runs on your PC when you are communicating
- A Network User Identifier (NUI) - an account with the telecommunications organization in your country that links you to other computers
- An account on any computer system that you want to use

Each of these items will be described more fully below.

A. Your Modem

Local computer store can supply modems. Current prices are ___. The modem you should buy should be "Hayes compatible", with both "V.21" and V.22" modes.

Modems can be supplied either in their own case (called "external modems"), or on a card that is inserted into your PC (called "internal modems"). Either will do. If you have a voltage regulator on your PC, and you use an external modem, be sure to plug your modem into the voltage regulator as well.

Your modem will plug into three places: a PC, a power point, and a telephone line. The first two are relatively simple, and the computer dealer who sells the modem should be able to show you how to do this (or better, may do it for you). The telephone connection may be tricky; however, most modems use a special plastic connector called an "RJ-11" or "modular" connector. Your modem should be supplied with a cable that has this connector on it.

On this connector, the center two wires are all that matter to the modem. They should be colored red and green. They must be connected to two telephones wires on your telephone line. If your telephone line has more than two wires, your will have to fin the pair that carry the telephone signal. They will have about 45 volts across them (which you can test with a voltmeter).

B. Your Communications Software

Once your modem is hooked up, you will need to run a program on your PC to command the PC to talk to the modem. Many such programs exists, with names like ProComm, Crosstalk, Relay, Qmodem, and SmartCom, all of which will do the job.

You will need to tell the software what sort of modem you are using. You must also tell it what telephone number to dial. When you get you NUI (in the next section), you will be told which telephone numbers you can dial.

C. Your Network User Identifier (NUI)

The communications software will tell your modem to dial the telephone and to send data over the telephone line to another distant computer. If you wanted to, you could telephone that distant computer directly, for example with an international telephone call. However, that is usually very expensive. An alternative is to call a computer that is in a local (in-country) city and have it relay your data to the distant computer. This is usually much cheaper.

_____ (the telecommunications organization of the country) runs a network of such "relay" computers. They call this network _____. To use this network, you will need an account with the telecommunications organization. They will issue you with a Network User Identifier, or NUI. When your computer call the telecommunications organization, you will be prompted to enter your NUI, so that the telecommunications organization can bill you for the call.

The country network computers can be reached by a local call in each of the following cities: _____. Each NUI is charged _____per month, plus usage charges.

D. The Distant Computer Service

Everything done so far has been in the purpose of getting your computer to communicate economically with some other, distant computer. To complete the connection, you must identify a computer inn the world with which you'd like to communicate. The number of the distant computer is called the Network User Address, or NUA.

Once your computer completes a call, the network will display something on your screen, and prompt you for you NUI with an asterisk (*). You will need to type a capital N,

followed by your NUI, followed by a dash (-), and then the number of the computer you wish to call.

For the purposes of illustration, consider the Tymnet information computer. It is located in the United States; its NUA is 03106004743. This is a free service that does not require you to have an account. (The reason it is free is that it only provides advertising and other information about Tymnet and related services.) If your NUI was "GEORGE", you would enter the following to your network to connect to the Tymnet information computer:

NGEORGE-03106004743

You can use this computer to test your NUI. Once connected, you will see menus of options that you can choose.

Most distant computer services require you to have an account, so that you can be billed for the service. Before you can use the service, you must tell it your account. For example, as soon as you are connected to the Carinet service (NUA 0311020100025), it will ask you for your account number and password. This account will be charged separately from your NUI account.

These distant computer services allow you to submit and pick up electronic mail ("e-mail") messages, to send telexes or facsimiles, to participate in conferences, or to find information in data bases. There are many such services, mostly based in the US, Japan, Singapore, or Europe. (The telecommunications organizations in Egypt, Indonesia, and the Philippines had plans at the time of the studies to introduce locally-based services.)

E. What It Will Cost

Telecommunications costs are measured in a variety of units (characters, words, segments, minutes, etc.), which can be difficult to compare directly. In this section, these charges will be reduced to "volume charges," measured in ___ (local currency) per thousand character, and "minimum call charges", measured in ___ (local currency) per call. This corresponds to the charges for telephone use. For example, a telephone call might cost ___ per minute with a minimum of ___ per call (i.e. 3 minutes per call).

For data communications, however, the best unit for measuring volume charges is not the minute but the "kilocharacter" or "kc". One kc is one thousand typewritten characters, including spaces and carriage returns. It is a unit that is usually pictured as a half-page; for example, a short, half-page business letter contains on kc, as does a telegram of 150 average words, or a telex of about 3 minutes.

Like telephone, data communications has a minimum call charge. For telegram, telex, and facsimile, the minimum is applied to each message; for computer communications, the minimum is applied to one connection, during which many messages may be sent.

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It is difficult to compare these costs precisely, because many assumptions must be made. Any comparison will necessarily be approximate, and should be considered a method of sending a one kc message from _____ (country), in ____ (local currency).

	Per 1 kc	
Minimum call		
By telex to another country	___	___
By telegram within country	___	___
By telex within country	___	___
By fax to another country	___	___
By fax within country	___	___
By e-mail to another country	___	___

As you can see, fax and e-mail are the least expensive, with e-mail much cheaper for international communications. E-mail has other advantages as well: it doesn't need its own phone line (it can share one with other uses); it is much less expensive when many people should get the same message; it's cheaper to install if you already have a PC; and the same equipment words for other computer services (like data bases and conferences). And the costs of computer communications have been dropping the last few years, and shows signs of dropping further.

E-mail costs vary depending on which distant computer service is used. Some charge a high subscription fee per month (___), with a small extra charge per kc. Other services charge less to subscribe (as little as ___ per month), but ___ per kc. Which service you choose will usually depend mostly on your intended use; who you want to communicate with, whether there are data bases you want to use, and how much you expect to use the service.

F. Typical Problems and Solutions

One advantage of computer communications is that it can be done on your normal PC, sharing your normal phone line, without requiring either a special computer or a dedicated phone line. The computer and modem act just like another extension on your existing phone line. Furthermore, it never expects to receive a call, but only to originate them; so it can share a line with a facsimile machine or an answering machine without any problem.

When the computer shares an ordinary phone line, you should take care that no one will try to make a call while the computer is using the line. Like a person making a phone call, the computer doesn't like to be interrupted by someone else trying to call on the same line; and in addition, any time someone picks up the phone while the computer is on-line, garbage characters will appear on the computer's screen.

It's easy enough to prevent this potential problem. You can place a manual switch on the telephone line where it enters your building. Throwing the switch one way will give the

computer the line; the other way gives the line to the usual telephones. Since the computer will use the line only occasionally during the day, this won't present much of an inconvenience. Alternatively, many modems have two plugs, one for "line" and one for "phone". If you connect the "line" plug to the phone line, and the "phone" plug to the usual telephones, the other phones will be prevented from using the line when the modem is operating.

Another common problem with computer communications is that computers don't tolerate noisy telephone lines well. When noise occurs, strange characters (like {) will appear on the screen. Persistent noise can make the communications very difficult. On some networks,there are special types of modems, or special computer software, which effectively eliminates the noise. These are called "error-correcting modems" or "error-correcting protocols". If you have a problem with noise, just hang up and try your call again; that may eliminate the problem. Alternatively, you could try each of the local telecommunications organization's telephone numbers in your area, and find which one gives you the least noise. If all else fails, try to call the number at a lower communication speed (for example, use 300 baud "V.21" communication instead of 1200 baud). Lower speeds usually have few errors.

When you first start to use computer communications, you may find problems you don't understand, or you may find something that confuses you. There are several places to go to find help. On is your local telecommunications network technical help number, they may some suggestions. Local computer stores also have technical people who can explain things, and who may be able to visit your office to help you. And you can also call other users of the local telecommunications network.

G. Contact Information

Here is a list of local country-specific network support contacts; including names, addresses, telephone and telex numbers. Also includes numbers for technical assistance and dial-in access numbers.

IV. Sample Questionnaire

It's always best to conduct the questionnaire in the local language. Ideally, this means that the individual team members (at least the team leader) should be fluent in that language, and the translation should be done prior to the team's site visits. If this is not possible, it is necessary to have an interpreter on hand. Bear in mind, however, that simultaneous translation is time-consuming and not as cost-effective. The following is a sample questionnaire in English.

BASIC INFORMATION

DATE:

PLACE:

NAME OF INSTITUTION:

MEMBERS: TYPE AND NUMBER

DATE ESTABLISHED:

NAME(S) AND TITLE(S) OF INTERVIEWEE(S):

NUMBER OF STAFF:

ORGANIZATION MISSION:

PRINCIPLE ACTIVITIES:

MANAGEMENT: (CEO=Chief Executive Officer)

What services does your organization provide to cooperatives?

What information does the CEO require from outside the organization? How is it received (such as government information, market prices for inputs or commodities, new technical information, etc.)?

Is there information that you would like or need that you cannot now get on a timely basis?

Is your accounting system manual, partially computerized, or totally computerized?

How often is your cooperative audited?

By whom? Any cost to the cooperative?

What are the most important or time-consuming duties of the CEO?
1.

2.

3.

Are there any areas of management that the CEO would like to see improved? Which?

TRAINING

Does your organization provide any training, seminars, scholarships, etc., for cooperatives?
If so,

Type? Who trained? How financed? Length?

Is there any follow-up or evaluation after these courses?

Do you give any training on or about computers?

What further training is needed by cooperatives and who could best give it?

_____

Would training on computers and software be useful for cooperatives here? YES/NO

If YES, which topics? _____
(basic literacy, accounting applications, advanced programming, systems maintenance, etc.)

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FINANCE:

Do you have a financial statement we could look at?

What are the sources of funds that support your activities:

a. Membership funds:

b. Banking relationships:
(if more than one bank, purpose and amount of loans from each bank)

c. Business activities:

d. Other (government, etc. . .):

What is your total debt outstanding (including loans from banks, debts to government, etc.)?

If any of the sources of funds are used to extend credit:

a. What kind of credit is extended (amounts and purpose)?

b. Which of the (above) sources is primarily used to support such credit facilities?

How are staff salaries paid?

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TRADE

1. Items or commodities exported by your organization:

Item	Annual Volume	Market	Direct/ Indirect	Source of price/ Market information
a.				
b.				
c.				

2. Items or commodities marketed domestically by your organization:

Item	Annual Volume	Market	Direct/ Indirect	Source of price/ Market information
a.				
b.				
c.				

3. Items or commodities imported by your organization: (especially food, inputs)

Item	Annual Volume	Market	Direct/ Indirect	Source of price/ Market information
a.				
b.				
c.				

4. Items or commodities purchased domestically by your organization:

Item	Annual Volume	Market	Direct/ Indirect	Source of price/ Market information
a.				
b.				
c.				

5. How do you finance your exports and/or imports?

6. Would a central source or clearinghouse for price and market information be useful? (Does it apply to items/commodities involved and where could it be established?)

7. Can you identify local products with potential for export, not now being exported? (product, market)

8. Can you suggest any items or supplies needed by your coops or your members that could be sourced from US coops?

COMMUNICATIONS

Which people or organizations do you most frequently contact? How? Why?
(phone, mail, telex, radio, visits, etc.)

	Organization	Medium	Reason
1.			
2.			
3.			

Do you use in-country long distance telephone service frequently? YES/NO Why or why not (cost, quality of lines, others have no phones, etc.)

	Number	Cost
Domestic Telex or Telegram per month:		
International Telex per month:		
FAX per month (domestic/international):		

Do you use radios? YES/NO Kind? _____ With whom? _____

How often? _____ Why? _____

Do you use a modem? YES/NO
How? (domestic/international, computer to computer data, e-mail, telex, node, etc.)

What information do you send/receive with your modem?

Can you think of any advantages to being linked with US cooperatives through electronic

mail? (trade, technical assistance, etc.)

COMPUTERS

Do you use any computers? YES/NO If so, what kind?

Number

___ IBM compatible(s)--PC/XT or AT? Are PC's networked? YES/NO

___ Hard disk(s) size: ___ MB

___ Other kind of computer: _____ Storage: _____
Number of Terminals: ___

___ Printers

Other peripherals, such as plotter? _____

UPS or voltage regulator? _____

Any modems? Type? CCITT/Bell Error checking? YES/NO Max baud? ___

Maintenance agreement? YES/NO Satisfied? YES/NO

Are spare parts easily available?

Are your current needs for computer equipment met? YES/NO

If not, what would you do with a computer/more equipment?

If you wanted advice on whether or what kind of computer equipment to buy, to whom would you turn and why?

Are there many reputable computer equipment vendors in your area? YES/NO/NONE

Software:

What do you use your computer for? (Accounting, Analysis, Word processing, Graphs, Desk top, etc.)

PURPOSE: PACKAGE:

To modify programs do you hire a programmer or do it in-house?

Are you able to get any software support?

Do you think accounting software that is specifically designed for cooperatives, for example, including modules for patronage refunds, would be useful here?

In any particular language?

Would a users group of cooperative computer user be useful to your organization, as a place to discuss cooperative applications, etc.?

Staff

How many of your staff can operate the computer/use applications? ____

Are any management staff?

How many are programmers? ___ In which languages? _____

Do you train staff in-house on computers, send them out, or hire them trained?

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Appendix B

Computer Guide for Cooperative and Agribusiness Managers

COMPUTER GUIDE
for
COOPERATIVE and AGRIBUSINESS MANAGERS

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Produced under:
U.S. Agency for International Development
Cooperative Agreement No. OTR-0192-A-00-8241-00
Innovative Approaches to Cooperative Management, Finance & Trade

1991

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Foreword

This guide is an output of Agricultural Cooperative Development International's (ACDI) Innovative Approaches to Cooperative Management, Finance, and Trade project. The project was funded under the U.S. Agency for International Development's Innovative Grant's program.

ACDI's mission is "to improve the economic well-being of farmers worldwide by assisting agricultural and member-owned organizations increase trade and achieve sustainable economic development."

This guide is directed towards managers of agricultural cooperatives, member-owned agribusinesses, and the institutions that support these organizations in developing countries.

Specifically it is for managers with little or no experience with computer technology. It is ACDI and the author's intent that the concepts and information presented here will be of assistance to managers planning to use computers to increase organizational efficiency by improving business techniques and practices. This guide will give the manager a basic overview of what computers are and how they work, how computers are used in a management information system, and how to incorporate computers into their organization.

Author Kim G. Glenn is president of Glenco Associates, Inc. He is a specialist in the application of information technology in and for Third World countries. Illustrator Philip Bourgoin is an associate of Glenco, Inc. He specializes in design and construction of computer work stations.

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> TechnoServe's mission is to improve the economic and social well-being of low-income people in developing countries through a process of enterprise development which increases jobs, productivity, and income. TechnoServe accomplishes this by providing management, technical assistance, and training to enterprises and institutions primarily related to the agricultural sector.

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> The Council is a not-for-profit technical and development assistance provider to cooperatives in the United States and developing countries.

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> VOCA's mission is to increase economic opportunities and incomes of members of cooperatives and other small- and medium-scale agriculturally based enterprises worldwide. This is realized through the provision of short-term, specialized technical assistance by highly skilled and experienced U.S. volunteers.

Jeffrey Levine
Project Coordinator,
Innovative Approaches to Cooperative
Management, Finance, and Trade
October, 1991

Computer Guide for Cooperative and Agribusiness Managers

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Glossary of Terms

Application

A computer program or set of computer programs and manual procedures that achieve a data processing objective.

Back-up

A copy of data, document file, and/or computer program held in reserve in case the working version is lost or damaged.

Baud

A unit of speed by which modem operations are measured. Equivalent to the number of signal changes per second. Each signal change may translate into one or more bits of information.

Bit

The primary building block of all computerized data. Represented by a digit 0 or 1.

BPS

Bits per second. Rate of speed by which data may be transmitted electronically.

Bulletin Board System

An electronic version of the local community bulletin board. Users may post electronic messages for others to read.

Card

In microcomputers this is an "add-on" device which is installed on the motherboard. Cards serve many functions. They provide internal modems, memory expansion devices, graphics, data paths for printers, and other computer devices.

CD ROM

Compact disk read only memory. A means of mass storage which uses a laser-written optical disk instead of a magnetic disk. Once written, it cannot be erased. Hence, it is "Read Only." See also Memory.

Central Processing Unit

a) The brain of any computer. This is the part of the computer which executes instructions, processes information, and coordinates the activities of your system.

b) It is the hardware unit which contains microprocessor, memory, and other primary computer devices.

Computer Conferencing

An application whereby a host computer enables groups of people to communicate via modem. The host computer notifies each user of new messages left by others.

CPU

See Central Processing Unit.

Customized Application

A computer program written specifically to serve an individualized function. A set of procedures to use a computer program to meet a specific objective. A computer tailor-made application.

Database

A set of data organized into records and fields. An address book is an example of a database. The name and address of each person is a record. Fields include first name, last name, street, city, and so forth.

Data Processing

The organization, manipulation, and presentation of data as useful information.

Desktop Publishing

A computer application for composing, formatting, and printing high-quality materials. Can include graphics and text.

Digital Information

Information coded into bits which can be stored and processed by computers.

Disk Operating System

DOS. A common operating system for microcomputers.

Disk Drive

A device that can read data from and write data to diskettes.

Diskette

A magnetically sensitive disk on which digital information can be stored and processed.

DOS

See Disk Operating System.

Dot Matrix

A class of computer printers whereby characters are formed by pins striking the paper through a printer ribbon. Characters are defined as a pattern of dots within a matrix.

Duplex

A telecommunications parameter which defines modem operations. Full duplex allows simultaneous two-way exchanges of data. Half-duplex allows data transmission in one direction at a time. Related to Echo.

E-mail

Electronic mail. A message composed on one computer and sent via modem or electronically within a network to another.

Echo

A telecommunications parameter which specifies whether your own terminal should display what you type on your monitor or if the remote system will echo what you type such that it appears on your monitor. Related to Duplex.

Electronic Mail

See E-mail.

Electronic Spreadsheet

A computer application which simulates the representation and processing of data in columns and rows, similar to an accounting ledger sheet.

FAX

Transmission of information by facsimile. Each page is scanned into digital information. The digital information is sent via modem and telephone to a receiving machine. The receiving machine interprets the information and prints a corresponding page.

Fields

An element of information found within a record of a database.

File

A data or program storage unit. A document file may contain text for word processing. A database file may contain data. A computer program file will contain instructions which the computer executes.

Fixed Disk

See Hard Disk.

Floppy disk

See Diskette.

Function Keys

Ten or twelve keys on a keyboard which perform special computer tasks. Operating system and application programs define these tasks.

Gateways

A telecommunications service which connects users in one country or location to internationally linked computerized data and communications networks.

Graphics

A computer application which permits the composition and/or presentation of graphic images. May be free-form, based on statistical analysis.

Hard Copy

Digital information printed on paper.

Hard Disk

Fixed disk. Can store large quantities of data. Designed to remain within the computer's system unit.

Hardware

Computer devices, including the system unit, monitor, keyboard, printer, etc. As opposed to computer programs, which are software.

Information Management

The process of managing information. May or may not include computers. As opposed to Management Information.

Inkjet

A class of printers whereby characters are formed by spraying ink directly onto the paper.

Keyboard

A fundamental device whereby a user can communicate with the computer. Similar to a typewriter.

LAN

See Local Area Network.

Laptop

A class of portable computers small enough to operate on your lap.

Laser Printer

A class of printers whereby characters are formed using laser-light technology.

Line Conditioning

A process whereby irregularities are removed from electrical or telephone lines.

Local Area Network

LAN. One or more computers linked together for the purpose of sharing data, programs, or other computer devices.

Management Application

Computer program and related procedures that specifically support management operations and decisions.

Management Information

A class of information that specifically supports management operations and decisions. As opposed to Information Management.

Megabyte

One million bytes. Approximately equivalent to one million characters. A measurement for computer media.

Megahertz

One million cycles. A measurement of computer speed. One cycle represents one primary event in computer operations at the microprocessor level.

Memory

Electronic storage area for data and/or programs. The microprocessor requires memory in which to store data and programs ready for calculations and execution. See also RAM. Sometimes refers to hard disk, CD ROM, and diskette storage capacity.

Microcomputer

A class of computers originally designed for single-user, single-task operations. Distinctions with mini and mainframe computers are blurring.

Microprocessor

The heart of any computer. Found within the central processing unit. A microchip which executes program instructions.

MIS

Management information system. A set of procedures and computer programs which support management operations and decisions.

Modem

Modulator demodulator. A device which sends and receives computer data over telephone lines by modulating and demodulating a carrier signal to represent digital signals.

Monitor

A visual display unit similar to a television. The primary output device for any microcomputer. Some standards include monochrome, CGA (color graphics adaptor), EGA (enhanced graphics adaptor), and VGA (video graphics array.)

Monochrome

Single color. A monochrome monitor displays information in black and white, black and amber, or black and green.

Motherboard

The main ciruit board of any computer on which the central processing unit components are mounted.

Mouse

A device with which a user may select options that appear on the computer monitor. Popular with desktop publishing and other graphics-oriented operating systems and application programs.

Multitasking

A process by which a computer may run several programs at the same time.

Network

Two or more computers connected together for the purpose of sharing data, programs or other computer devices, such as printers.

Operating Environment

a) The physical characteristics within which a computer system may operate. Includes electricity and ambient temperature.

b) Combination of network architecture, operating system, and/or technical configuration of a computer system.

Operating System

The primary computer program for any computer. The operating system is running when no other program is running. It performs the basic procedures for the computer's operation and provides the means for executing other application programs. See Disk Operating System, UNIX.

Operational Application

A set of procedures and computer programs that meet the operating needs of any business or organization.

Packet Radio

Computers and radios working together for communications. Data is sent as packets of radio signals which can be interpreted by receiving radios connected to computers.

Parameters

Variables which can be changed by the user. For example, they may include telecommunications standards for modem operations.

Parity

An error-detection method for telecommunications. A parameter that must be the same for both the remote and the local computer system.

PC/Fax

An application which allows a microcomputer to function as a FAX machine.

PC/Personal Computer

Personal computer. A class of microcomputers that generally adheres to standards originally set by IBM but now employed by other companies.

Peripheral Devices

Computer components aside from the monitor and those found within the system unit. They include printers and external modems.

Personal Computer

See PC/Personal Computer.

Plotters

A computer device which draws graphs and graphics by using pens.

Port

A path by which data may flow between a computer and another device. A printer port is a common example.

Power Supply

A device which converts external electrical power to that which the computer can use. Usually found within the system unit for desktop computers. Laptops and desktop portables may have an external power supply.

Program

A set of detailed instructions which the computer can interpret and execute to serve some useful function. A computer requires a program to operate.

RAM

Random access memory. Electronic memory in which the microprocessor stores data and programs ready for calculations and execution.

Records

A grouping of associated data fields in a database file. Name and address information may be one record in an address-book database.

Resolution

The level of definition by which a monitor displays characters and graphics. High resolution means high definition, very clear. Low resolution means characters may be fuzzy or jagged-looking.

Software

One or more computer programs working together to achieve logically related computerized operations.

Spike

A brief increase in electrical voltage. May damage computer equipment.

Standby Power Supply

A device which provides temporary power to a computer system when normal power is disrupted.

Surge

A temporary but noticeable increase in electrical voltage. May damage computer equipment.

System Supervisor

A person held primarily responsible for computer operations.

System Unit

The main portion of a computer containing at least the central processing unit, disk drives, and power supply.

Telecommunications

A class of communications that includes the use of computers. May broadly refer to all distance communications media including telephone, telex, FAX, E-mail, and radio.

Transformer

An electrical device which converts voltage.

UPS: Uninterruptible Power Supply

An electrical device which provides continuous power whether or not main electrical power is present.

Unix

An operating system for multi-user networks.

User Group

An association of computer users who share skills and information among themselves. May include people who are interested in but do not yet actually use computers.

Viruses

Computer programs designed to copy themselves in hidden manner to other computers. Often destructive.

Volt-amp

An electrical power unit. Electrical devices are rated by volt-amps. Watts are approximately 80 percent of volt-amps.

Voltage

An electrical unit. 220 volts and 115 volts are two primary international voltage standards.

Watt

An electrical power unit. Electrical devices are rated by volt-amps. Watts are approximately 80 percent of volt-amps.

Windows

A graphics-based operating system. Works with pull-down menus and icons instead of entered command words as with DOS-based operating systems. Several programs may be run simultaneously. User views each as a window on the monitor.

Word Processing

A computer application for composing and printing text.

Note: Look in the glossaries of computer and software manuals for definitions of other terms. Make notes in the space below.

Write in the space below. Use pencil.

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Chapter 1: Introduction

In this section we will suggest some ways to use this guide. We will discuss some of the guide's limitations as well as the general limitations of computer technology. We will introduce some fundamental information management concepts. Finally, we will discuss a strategy for introducing computer technology into your organization.

1.1 How to Use this Book

This book is a practical guide. New users can use this book to help develop a plan to introduce computers into their cooperatives. Experienced users can use this book to improve existing computer operations.

Review the Table of Contents first. Note that the chapters are in a logical order. Review the major headings for each chapter. At the beginning of each chapter you will find a more detailed table of contents for that particular chapter. These chapter tables of content include subheadings. Use the index to find key topics that are discussed in several different places.

Use this book as a training manual for computer users in your cooperative. When you are finished with this guide, look for someone else who may be able to use it. Loan or give it to them. Use the blank space provided to make notes. Use pencil to permit easy changes to your notes.

For the New User

"New users" are managers who have no experience with computer technology. Perhaps you already have a computer and are not yet using it significantly. You will find it most useful to read this guide from start to finish. Some areas you may not understand. Do not worry about these areas. Skip them. Use the Glossary when you do not understand a term. This first reading will give you a general view.

Begin reading the guide a second time. Keep a pencil and paper nearby. Begin to draft a plan to introduce computer technology into your cooperative. Note decisions that you must make. Think about them. Do not make these decisions. Consider all the possible options.

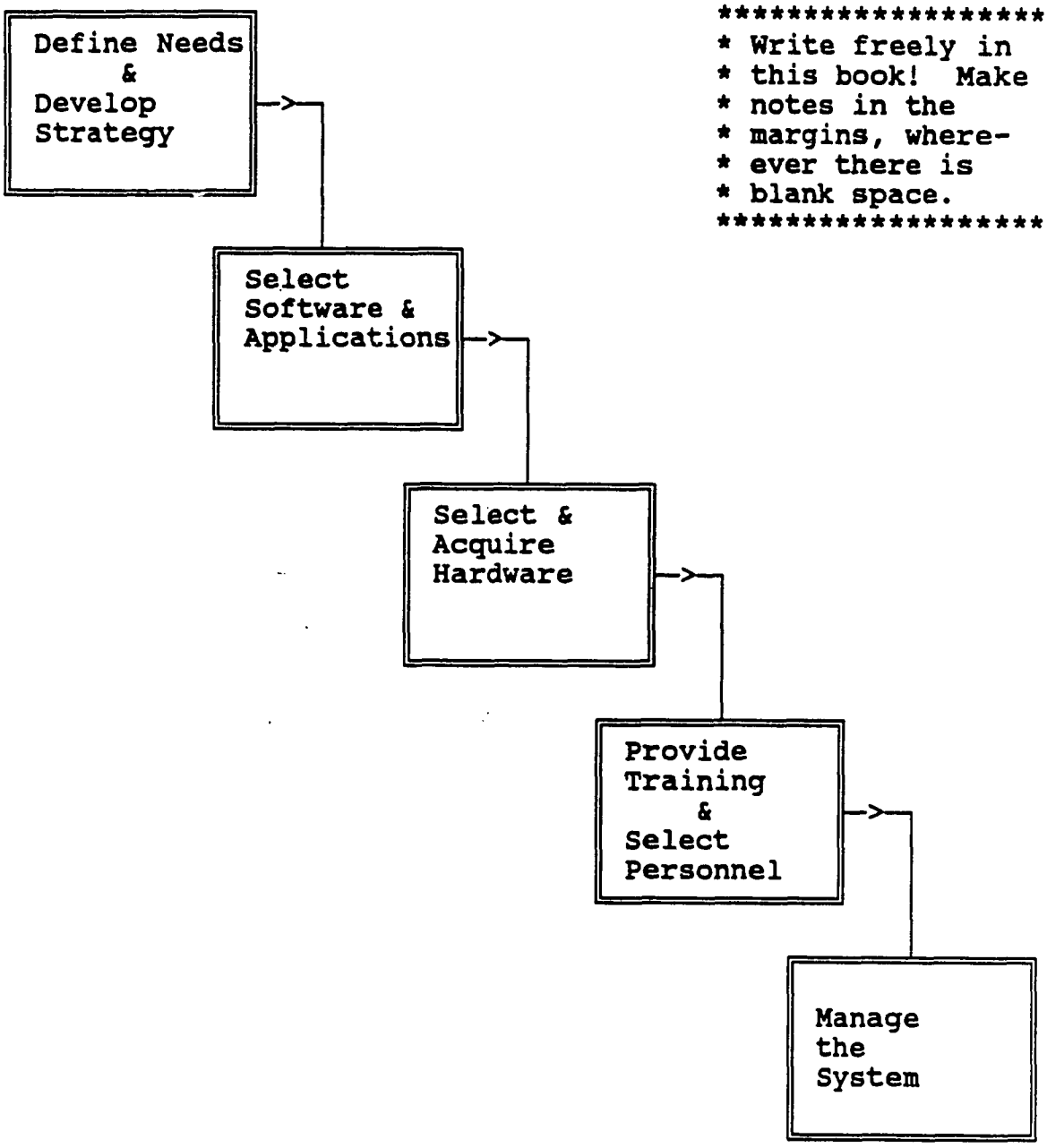
Don't expect this to work overnight. It is reasonable to allow one year or more for even small computer installation plans.

Visit other cooperatives, organizations, and businesses that are using computers. They are often enthusiastic about their computers. Don't underestimate their willingness to share information. Consider the decisions you must make. Learn from their experiences.

Finally, draft a detailed plan. Make your decisions based on all you have learned. Refer back to this guide. Review the checklist in this Introduction often. Ask colleagues to review your plan. Be prepared to make changes. Technology is changing very quickly.

Write in the space below. Use pencil. Refer to the flow diagram on the next page.

Implement your plan. Think about these stages for computerizing your operations.

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* this book!  Make *
* notes in the     *
* margins, where-  *
* ever there is    *
* blank space.     *
********************
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For the Experienced User

An "experienced user" is a manager who already has significant computer technology in the cooperative. You may be considering ways to improve computer operations. You may want to evaluate your computer operation. You may have problems with your computer operation.

Review the Table of Contents carefully. Locate the sections that interest you. Read these sections in detail. Skim over the other sections. Use the index to find all references to topics that are important to you.

Write down decisions that you must make. Consider all the possible options. Visit other similar computer operations in your area. Gather the information you need.

Draft a plan to achieve your objective. Share and review it with others. Especially include those who will most be affected by it.

Implement it.

1.2 Limitations

This guide cannot cover all relevant material. It cannot answer all questions. Computers will not provide all answers for your management and data processing questions. They will not solve all problems. They can only be effective tools.

Guide Limitations

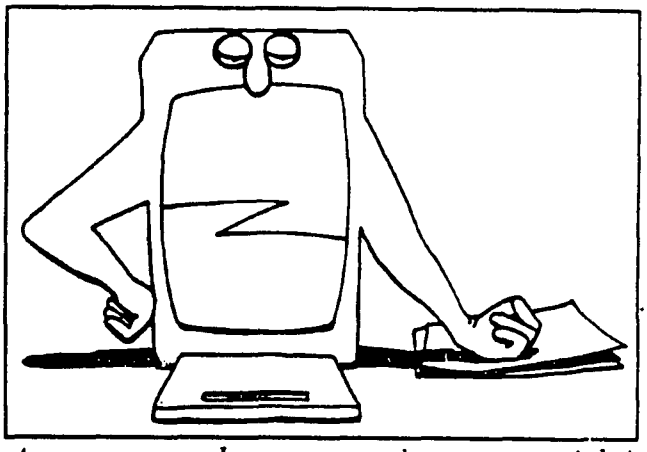
Computer technology is advancing rapidly. This guide attempts to provide fundamental concepts. These concepts will not change much, even when technology does. This guide suggests trends that may be relevant in the future. Managers will need to consult with dealers and other users for many details. These details are important for making decisions and developing plans.

A guide is no substitute for practical experience. Allow yourself time to learn. Allow yourself opportunity to gain experience. Where available, use the experience others have gained.

Computer Limitations

A manager proudly says to his associates, "We have finally installed a computer! Now, what shall we do with it?" In this case the manager did not have a plan before buying his computer.

A computer is often a solution without a problem. It sits on a desk without being used. At the same time, people may continue to do work which the computer is designed to do.



A computer makes an expensive paper weight!

The successful application of computer technology requires a plan. A plan will define the tasks which the computer will accomplish. Your plan will include a job description for the computer. The computer system must have the qualifications for the job. Your plan will help find the right computer system for the job.

Some jobs only people can do. These jobs require human judgment, intuition, creativity, and simple common sense. Computers will liberate people to do these jobs.

Computers can be powerful tools for processing data into information. Time and resources must be allocated to learn to use these tools effectively. The quantity of time and resources will depend on the complexity and scope of the job description for the computer system.

The cost may not be worth the benefit of installing a computer system. A plan will help determine this. A plan will help you avoid wasteful mistakes.

A computer will not perform miracles. It will not automatically correct poor decision-making processes. A computerized version of a poor system is only a computerized poor system.

1.3 Information Management Concepts

Management is a Decision-Oriented Process

A manager's life is full of decisions. These decisions directly affect the success of the organization. Bad decisions are based on wrong, inappropriate, or late information. Poor information requires managers to make guesses based on assumptions. The chance of success is similar to the odds of winning a lottery, not very good.

Data Processing as a Foundation for Management Decisions

Good management decisions are based on timely and accurate management information. Good management information is processed from timely and accurate operational data.

A manager may make decisions about cash needs in the coming months. To make these decisions, it is important to know cash requirements in past months. It may be important to know the cash requirements for the same months one year ago or two years ago. If accounting information is unavailable, the manager must make major assumptions. The manager must guess.

Information is the lifeblood of a business organization. Improving this information improves the health, productivity, and growth of the organization. Computers can assist in the collection of operational data, the processing of it into management information, and the formatting of it for useful presentation.

Computers can help managers be more productive. This is especially important where skilled labor is scarce. Managers and other skilled personnel may have more time to use. They may use this time interpreting good information instead of making guesses. They will have time to apply intuition, judgment, and common sense to making good decisions.

Applications which Provide Decision-Oriented Information

Accounting

Accounting is the most obvious source of decision-oriented information. This is one of the most important applications for computers. With computers accounting clerks may devote their skills to interpreting calculations and presenting them to management in timely and useful manners, instead of adding long columns of numbers. Electronic spreadsheets are computerized versions of ledger sheets. Computers can easily present accounting information graphically for analysis.

Inventory Management

Inventory management and stock control are other important data-processing areas. Computers can replace bin cards, index cards, and ledger sheets. Computers can automatically adjust inventory balances based on daily sales and receipts. Inventory management personnel can devote more time to managing their inventories instead of counting items.

Market Research

You can develop your own database of market information. Over time, you can analyze this data for valuable market information.

International computerized databases are available to show market information. These databases may be used by almost anyone with a personal computer and access to a normal telephone. Managers can learn the current value of produce and products on the international markets. They can analyze the changing value of items over time. This information may help them negotiate market prices for their products. Managers may make informed decisions about which products to grow or manufacture in the future.

Customer and Membership Databases

Customer and member information can be stored in a computer database to improve communications. The computer can easily and automatically print mailing labels and prepare customized form letters. Managers may analyze member and customer statistics. This information may help managers design strategies for recruiting new members and customers.

Telecommunications

Modern communications technology combined with computer technology now offers great opportunities. Managers may exchange information and ideas with others around the world. See the chapter on telecommunications for more on this important management application of computer and communications technology.

1.4 A Strategy for Introducing Computer Technology

Develop checklists for introducing computer technology into your cooperative. See Chapter 8 for some samples you may use to begin developing your own complete checklists. Address each item in your plan. If you like, check off each item when you feel your plan has covered it.

What applications software do we need? Which computer will best run them? How many people need to use computers for these applications? How many computers do we need? Where do we put them? When should we get them? Who will use them? What training do they need? Should they be a centralized network, a decentralized network, or a set of stand-alone systems? How much will all this cost? Where will the funding come from?

Your strategic plan will answer all of these questions and more. Include others in discussion of your plan.

Above all, start with assessing your needs. Computers are not appropriate in all circumstances. Write down some data-processing needs that come to your mind right now. Use the space below. Come back to this page to review them later. Use pencil so that you can change them.

Write in the space below. Use pencil.

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Chapter 2: A First Look at Computers

Computers are simply machines. They take raw material and convert it into a useful product. Understanding what computers are and how they function will help you understand what they can and cannot do.

2.1 What Computers Can Do

Computers can be powerful tools. However, by themselves they are useless. They require detailed instructions, called "computer programs." Programs may work together to provide a complex application. In this sense, we refer to these programs as "software." These applications may seem to perform intelligent tasks. However, the intelligence is actually found within the software.

The manager must decide which applications the computer can best do and which applications are best left to people. This section may help.

Some managers follow these general guidelines when looking for potential computer applications:

- Look for tasks which you or your staff perform repeatedly on a daily, weekly, or monthly basis. Computers easily handle repetitive work.

- Look for tasks where you or your staff add long lists of numbers or perform mathematical calculations. This is an area where the computer may be an effective tool. Accounting and payroll calculations are a good example.

- Look for index cards and files in your organization which contain information about people or things. This suggests that a computerized database may be very useful.

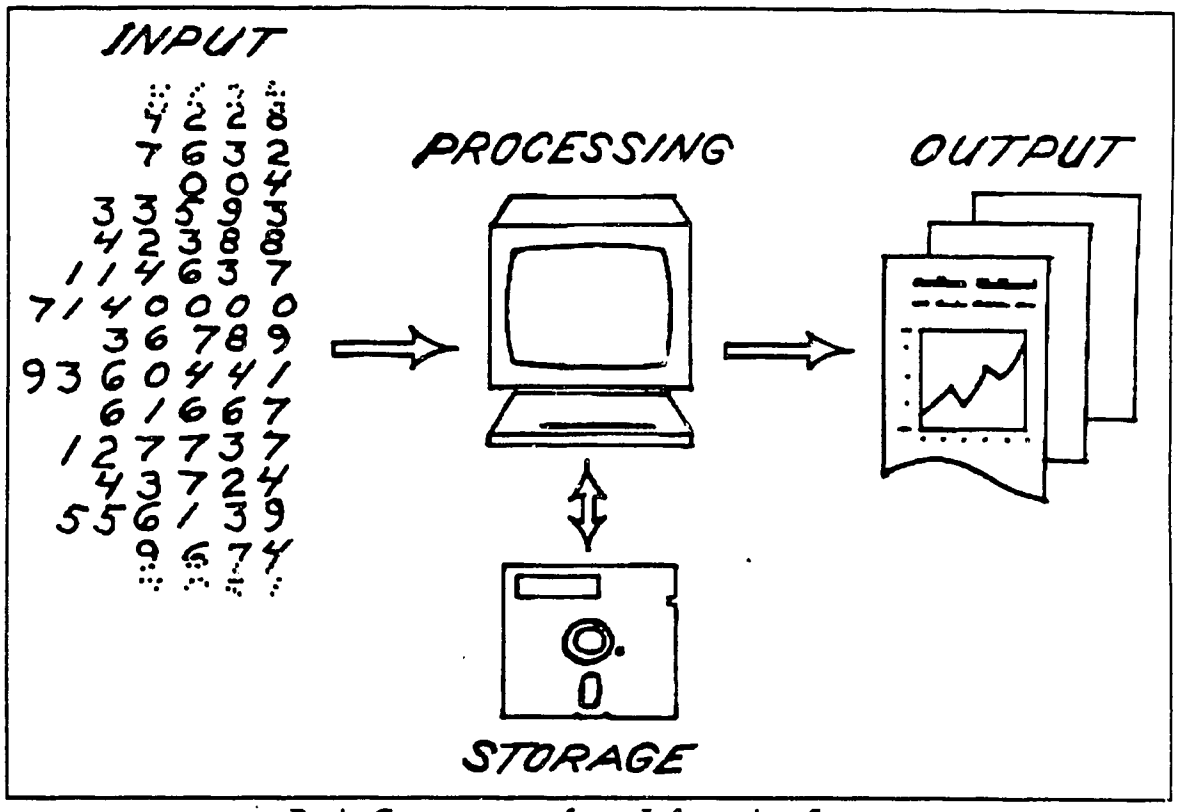
- Visit other organizations that use computers. Review their applications.

Any organization requires a framework of systems and procedures. These systems and procedures work together to guide daily operations. Managers use, participate in, and are responsible for systems.

Any system includes at least three components:

INPUT -> PROCESSING -> OUTPUT

The most important component is OUTPUT. OUTPUT defines the entire system. System analysis focuses first on output.



Basic Components of any Information System

For example, a cooperative determines it is necessary to improve inventory mangement. This is the desired system output. To develop this, the manager identifies what input will be needed and what steps are necessary to produce better inventory reports. The input will be receipts of stock, sales, and "lost inventory" records. The processing will be done by a computer program which tracks inventory movement. When implemented, the system will produce inventory tracking reports.

An information system includes a fourth component: data storage. This component is linked to the processing component. In the above example, a database of inventory information will be an important part of the improved inventory system.

A primary output for any management information system (MIS) includes reports. These reports should be based on good quality information. They then provide a basis for good quality decisions. These outputs (decisions) require good quality data as inputs. The raw data is processed into useful information. A simple example is a monthly financial report.

A systems approach may be useful for identifying areas where computers may be cost effective.

2.2 What Computers Are

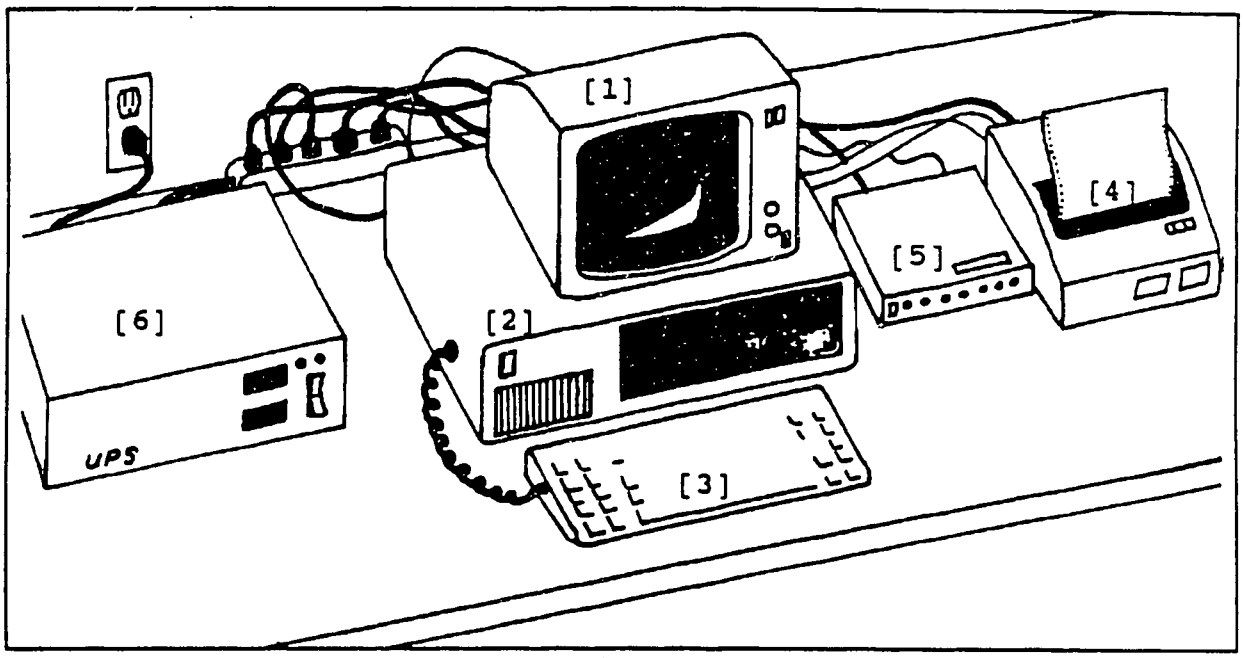
Computers seem very complicated to many people. They can perform tasks which may seem miraculous. At times they may seem even intelligent. However, they are simply machines. They perform tasks that they are designed and instructed to perform.

They contain only a few major components. We can easily identify these components. Trained, qualified personnel should make most repairs and alterations. However, almost anyone can open a microcomputer and review the contents, provided they exercise some caution. Many microcomputer owners install components in their own computers. Routine preventive maintenance procedures will be described later. Where no other resources exist, you should be able to perform these procedures yourself.

We will consider microcomputers (sometimes called personal computers, or PCs) here. Mini and mainframe computers have components which perform similar functions. Their components may look very different.

Can you identify the components in the illustration on the next page? Note them here in pencil, then check your answers. Use pencil.

Major Components



Typical Components of a Desktop Microcomputer

The major components of a microcomputer system include a computer monitor, system unit, printer, and modem. Often you may find a standby or uninterruptible power supply included.

Monitor [1]

The monitor may be monochrome or color. Monochrome means one color. Monochrome monitors may be green and black, white and black, or amber and black. Some people prefer monochrome because it may cause less strain on eyes. Monochrome is always cheaper than color. All popular business software will run on monochrome monitors. Good quality color monitors can be much more pleasant to use. They may add to accuracy. They provide stronger visual orientation than monochrome monitors do.

Color monitors come in several standards. CGA means color graphics adaptor. It is the oldest standard for color monitors. It provides poor resolution. Characters look "boxy," and diagonal lines look like tiny stairs. Some software will not work with CGA monitors. Eyestrain is a common complaint from people using CGA monitors.

EGA means enhanced graphics adaptor. It provides better resolution than CGA. However, it is now considered an old standard, although newer than CGA.

VGA means video graphics array. It is the most popular standard for color monitors now. This standard may remain for some extended period of time. VGA monitors come in a range of resolutions. The poorest VGA resolution is as good as EGA and far better than CGA. Most software now makes use of VGA color, if available. Word Processing, for example, will use color to indicate special sections of text. Each section may be printed differently. Some may be underlined. Others may be bold or italics.

No doubt new standards will be developed, such as XGA (extended graphics array). However, they are appropriate for specialized graphics applications only.

System Unit [2]

The system unit is usually a box which contains the essential parts of the microcomputer. These are the data storage devices, the power supply, the motherboard, and the optional cards.

These will be discussed in detail later in this chapter.

Keyboard [3]

The keyboard is the primary device by which we enter information into the computer. It works like a typewriter keyboard. Some keyboards "click," and others are quiet. People who know how to type have a big advantage over others when learning to use a computer.

It has additional keys, called "function keys." These keys may be numbered from 1 to 12. Function keys have special tasks. These are defined by the computer program in use. Function key number 1 (F1) is a common key for getting help. Pressing F1 will often provide the user with more information or explanation about the computer program they are using.

Computer keyboards use an ENTER or RETURN key in much the same way a typewriter uses a CARRIAGE RETURN key.

A numeric keypad is used for entering numbers. It is similar to a calculator.

A set of cursor control keys (with arrows on them) are used by computer programs. A cursor is a small flashing light or similar indicator on the computer monitor. The letter or number key you press will cause that character to appear at the cursor location. The cursor control keys may move the cursor around. This is defined by the program you are running.

Control and alternate keys are used in combination with other keys to enter special information, commands, and characters. These also are defined by the computer program.

A "mouse" allows the user to move around the screen easily without pressing the cursor control keys repeatedly. It is an extra device. It may require special software to use.

Printers [4]

The most common computer printer is called "dot matrix." A dot matrix printer uses small pins which form characters depending on which pins strike the ribbon and paper. Twelve pins are a standard set. They can provide clear print, but it is obvious that the characters are made of small dots. A 24-pin printer prints more dots closer together. Most people cannot tell the difference between these characters and those printed with a typewriter. Other pin set sizes are available. Most dot matrix printers can print between about one-half and three pages of regular text per minute. Graphics images take much more time to print. Speed depends on the number of pins and the mode of printing. Draft mode is very fast. Letter-quality mode is slower.

Inkjet printers spray ink onto paper. The print quality is very good. The ink often will smear when wet. They are not much faster than dot matrix printers. They are very quiet. The price may be slightly higher than dot matrix printers.

Laser printers may be five to ten times more expensive than dot matrix printers. They can print about four to eight pages of regular text per minute. As with dot matrix printers, graphics images take longer. They use laser technology. They are almost completely silent. Laser print is the best quality available for most microcomputer applications. Laser printers are appropriate for desktop publishing of formal documents.

All of the above printers will print graphs and graphic images. These take longer to print than text does. Plotters are special devices that will print graphs more quickly using color pens.

Modems [5]

"Modem" means "modulator/demodulator." This is the process for converting computer signals into signals that can be transferred over normal telephone lines. They may be found as a card inside the system unit (see next section) or as a separate device that sits near the computer.

Modems are required for telecommunications applications. Their most common specification is speed. Modem speed is measured in "baud" rates or bits per second. A bit is one on/off signal. Generally eight bits are required to transmit one character of information. Common

modem speeds are 300, 1200, 2400 and 9600 baud. Generally speaking, 1200 baud is the minimum appropriate speed for any telecommunications application.

See the chapter on telecommunications for more details about modems and their characteristics.

Uninterruptible Power Supply (UPS) [6]

A UPS provides electricity to computers automatically when the main electrical supply is interrupted. All UPSs use batteries to function.

"True" UPSs actually use main electricity supply to continually charge batteries. Electricity from the batteries is converted to a form that the computers can use. The computers run off the batteries all the time. This is an "on-line" UPS. These models are more expensive than "standby power supplies." They provide the best power for computers.

Standby power supplies are often referred to as UPSs. However, they allow the main electricity to pass directly to the computers. Electronic sensors monitor this main electricity. When there is an interruption, an electronic switch provides electricity from the batteries to the computer. When the main electricity is restored, the switch turns off the battery electricity. The main electricity recharges the batteries automatically.

Unstable main electrical supplies may require a UPS for your computer system. We will discuss this in more detail under the hardware chapter of this guide.

A Look Inside a Computer System Unit

Most system units can be opened easily by removing a few screws and lifting the cover. User guides and manuals should come with the computer. They may contain detailed instructions for opening a system unit. With reasonable care, anyone can open their system unit.

You may need to open the system unit for routine cleaning or to remove or add components. When available, use qualified personnel. Seek practical hands-on training.

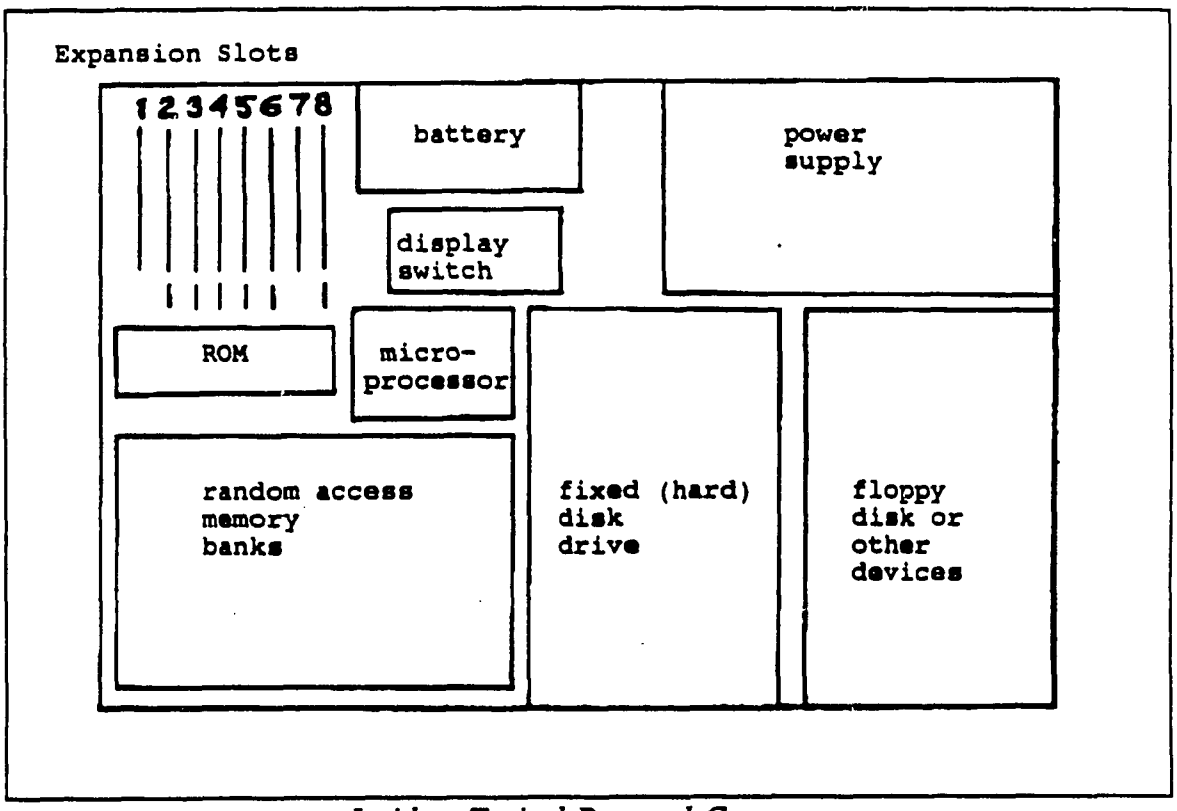
Turn off your computer and unplug it before opening it!

Computer devices generally have two cables. One cable provides power. The other provides a path for data.

Carefully disconnect all cables from the system unit. You will find a data cable for the printer. The printer's power cable is usually connected directly to a power outlet. Similarly, you will

find a data cable for the monitor connected to the system unit. The monitor's power cable is sometimes connected directly to the back of the system unit. Note which cable goes into which socket. It may be helpful to mark cables and sockets with paper, tape and markers.

Locate the screws which hold the system unit cover onto its frame. Often there are three or four of them. They may be located on the back panel of the system unit and on the sides. Follow the instructions in your users guide or manual.



Inside a Typical Personal Computer

Central Processing Unit (CPU)

The CPU is the brain of any computer. It executes instructions, processes information, and coordinates the activities of your system.

The CPU and the system unit are often confused. The CPU is found within the system unit box. It is a group of hardware components including the microprocessor, memory, and other primary computer devices. The system unit contains the CPU and other devices as illustrated.

Motherboard

The motherboard contains the main electronic components of the computer. It is a large circuit board. It is often mounted to the bottom of the system unit case. Above it are placed all the other components. These other components hide much of the motherboard.

On the motherboard you may see "slots." There may be five or even eight of them. In these slots one or more electronic cards are mounted. They exchange data with the central processing unit. These are discussed in more detail below.

The main microprocessor chip is located on the motherboard. There may be empty sockets for optional chips. A math co-processor chip is an example. Random access memory chips are also usually found on the motherboard. Empty sockets may be available where more optional memory may be added. Memory chips may also be found on one or more cards.

Microchips are usually black, flat, electronic components with many "legs" by which they are mounted onto the board. They are labeled with numbers and letters by which they are identified according to industry standards.

Cards

Adding cards is one way of expanding the capabilities of your computer. These cards are special electronic circuits that help the motherboard communicate with the monitor, printer, modem, disk drives, and other devices. Sometimes a modem is a card inside the system unit. These are called "internal modems." Cables are connected to these cards through openings in the back of the system unit case.

Other cables may come from other components within the system unit. Typically there is a card which controls the operation of the hard disk and/or floppy disk drives. Cables will lead from these drives to the card.

You may remove these cables but mark them carefully. Pay special attention to how the cable connector matches the pins on the card. Usually there is only one possible way to connect them. Reconnect the cables carefully. It may be easy to bend connector pins. Refer to any instructions that may be found in the computer and card documentation.

Cards may be removed by unscrewing a single mounting screw. Firmly grasp the card. Place your fingers on chips and circuitry that are firmly soldered to the card. Avoid bending any circuit components. Pull firmly on the card to remove it from the slot. You may need to lift one end and then the other in a "rocking" motion.

Hard Disk and Floppy Disk Drives

You usually enter programs and data into the computer by using the keyboard and the floppy disk drive. These programs and data may be stored on a hard disk. They may also be copied to other floppy disks.

On many microcomputers these drives are located near the front right-hand side of the system unit. The hard disk may be underneath the floppy disk drives. Some microcomputers have one floppy disk drive and one hard disk. Others have two floppy disk drives and no hard disk. Most computers now require a hard disk to operate any significant application. Sometimes a computer may have an external disk drive that is connected to the motherboard by a cable.

Floppy disks may be called diskettes or simply disks. Their standards are changing. They may range in size from 3.5 inches to 8 inches in diameter. A popular size for microcomputers has been 5.25 inches. They usually hold 360,000 characters of information (360 kilobytes). These floppy disks are "double sided, double density". A "high density" 5.25 inch disk will hold 1,200,000 characters (1.2 megabytes). A byte is a computer term that is roughly equivalent to one character of information (such as a letter, a number, or even a space). The smaller 3.5 inch disks can hold 720,000 characters or 1,440,000 characters in high density format. Many people prefer these high density 3.25 inch disks. They are used especially in laptop computers.

Hard disks are sometimes called "fixed disks" because they are designed to remain inside the computer system unit. They hold many times more information than can fit onto any single floppy disk. Many microcomputers include at least a 40 megabyte hard disk. This hard disk will hold the equivalent of about 40,000,000 characters of information. Hard disks with a much larger capacity, beyond even 100 megabytes, are common. Hard disks work much faster than floppy disks. They are an important component in any computer.

Hard disks do fail. They have a specific lifespan. When they fail, all the information they are storing may be lost. For this reason it is important to copy important information onto floppy disks or other hard disks for safekeeping. This is called "backing up the hard disk," or simply "making a back-up."

Power Supply

The power supply is a major component found within all system units. It converts the alternating current (AC) power to direct current (DC) power used by the computer. Usually the computer only uses 12 volts direct current. The power supply may be easily recognized because it usually contains a fan which circulates air to cool itself. Laptops and portable computers have very different power supplies.

Power supplies for typical desktop computer systems often have a switch on the back. This switch can be seen without removing the cover of the system unit. It will permit the system unit to work where electricity is nominal 220 volts or nominal 110 volts.

There is nothing within the power supply which users can or should modify. Where electricity is unstable, the power supply may fail and require replacement by qualified technicians.

2.3 How Computers Work

When a computer is turned on, it generally reads an operating system program from a disk or hard disk into its active memory (RAM). Users can then instruct the operating system to read and execute other programs to perform specific tasks.

Computer Programs

Computers follow detailed instructions in their computer programs quickly. The instructions must be extremely detailed because computers are totally without intelligence.

If we say, "Go to the store," most people will have a good idea what this means. A computer would need hundreds, maybe thousands, of instructions to understand and follow this instruction. If the computer were part of a robot, the first instruction might be to "stand up." Then many more instructions would follow which would allow the robot to walk, to avoid obstacles, to open doors, to find the store, and so forth.

These instructions are part of the computer program. Programs are usually stored on hard disks and floppy disks as "program files." When you instruct the computer to follow the instructions in one of these programs, the computer reads the program from the disk into random access memory.

Random Access Memory (RAM)

Random access memory (RAM) is an important component of a computer system. This is where the computer holds its data ready for computations. This is where the instructions are executed. This is where all the immediate data and programs required by the application are stored.

Usually, a PC compatible computer must have at least 640 kilobytes of RAM to run major software applications. Generally speaking, more RAM will permit the computer to operate at faster speeds. It might be similar to having larger brains that can store more information at one time. RAM forgets everything as soon as the power is turned off. It must read the instructions and data again off of a disk in order to continue functioning.

Operating Systems

A microcomputer requires a special computer program called an operating system. This operating system works with other applications programs to display information on a monitor, to send and receive data through a modem, to print data on paper using a printer, and to use other computer devices.

A widely used operating system for PC compatible computers is referred to as the disk operating system, or DOS. As the name suggests, DOS contains programs for managing data and software stored on hard disks and floppy disks.

Computer systems which serve multiple users may depend on other operating systems. See the chapter on applications for further discussion of operating systems.

Applications Software

Computers can perform standard tasks that apply to many business operations. Applications are computer programs, sets of programs, or specialized uses of computer programs to achieve a particular data-processing objective.

Vertical market applications are specific to a particular industry, business, or profession. There are many specialized agricultural applications.

Horizontal market applications are those which can be used across most businesses and industries. These include standard accounting packages and word processing.

There are five major forms of general applications software: electronic spreadsheets, database management, word processing, telecommunications and graphics. There are countless other applications available.

Electronic Spreadsheets

Electronic spreadsheet software simulates operations often done manually on ledger sheets. You enter data in columns and rows. Formulas can also be entered. The computer uses these formulas to automatically perform calculations on the data stored in the columns and rows.

For example, you may enter a column of numbers. At the bottom of the column you may enter a formula which instructs the computer to automatically calculate the sum of all these numbers. If you change one of the numbers, the computer automatically recalculates the sum.

A typical ledger sheet may contain columns to represent different accounts. You enter transactions row by row affecting these accounts. At the end of the month, you may enter formulas to automatically calculate all the new balances for each account/column. You may then print and sign the ledger sheet as a permanent and official account document.

Electronic spreadsheets may provide sophisticated graphic illustrations of data. These may include pie charts, bar graphs and line graphs. Such graphs would take hours to prepare manually. The computer can display such a graph almost instantly.

Database Management

A database is any collection of logically related information. An example is a list of names, addresses, and telephone numbers of customers or members. Such information may easily be stored on index cards. An index card is the equivalent of a "record" in a computer database. Each item of information, such as the member's name, is a "field." See the chapter on applications for more information about databases.

A computerized database of such information can become a powerful tool. At any time you may print out a set of mailing labels automatically. This is faster than printing them by hand or on a typewriter. You can also tell the computer to sort and filter the database by any of its fields. In this way, you can receive a report of all members in a particular town or who joined during a particular month, or who have birthdays in a certain month. You can present a report that is alphabetical by member name, or sorted in order of seniority.

Accounting information may also be stored in a database format. Each invoice may be entered as a record. A database management application may perform calculations on this information. Programmers may use a database management application program to develop a customized accounting application.

Word Processing

Word processing is a common application for computers. A word processor may function similarly to a typewriter. However, before printing the document, you may review and modify it using the monitor. The computer may check spelling and grammar. Some word processors even incorporate graphic illustrations and fancy type.

We composed this guide using word processing software on a PC-compatible microcomputer.

Telecommunications

Telecommunications combines computers with communications technology. Almost anyone with a computer, modem and telephone can send and receive electronic mail, FAXs, and valuable information from almost anywhere in the world. This will be covered in considerable detail in Chapter 7.

Graphics

Graphics software provides capability for drawing, painting, and developing visual presentations of statistical data.

What questions do you still have about computers? Write in the space below. Use pencil. Check off your questions when you feel you have the answers.

Write in the space below. Use pencil. What applications are the most important for you now? Who do you know who has computers? Who should you call to make an appointment for a demonstration?

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Chapter 3: Applications

Defining your computer applications needs is the first step in any computerization process. Your computer application will define your software requirements. Applications exist for day-to-day operations. Special applications can support special management functions. Your intended application will also help define network (if any) and operating system requirements.

3.1 Defining Application Needs

A computer business application is a computer program or a set of programs that meet defined business needs. Computer programs are sometimes referred to as "software."

"Information management," and "management information" are two terms that are often confusing. The former refers to managing any kind of information. The latter refers to information that is required in order to manage an organization or perform a management job function. A computerized business application will help improve your information management capability.

In computerizing payroll, accounting, and stock control we are improving the ability to manage operational information. This operational information should support management functions. We have not addressed, however, improving the "management information" within an organization.

Defining management information is a process that focuses on functions. "Functional information" may be a clearer term to avoid confusion with "management information."

Over time and given changing conditions within and without the institution, actual functions of key positions may change. Information originally solicited may no longer be relevant. New technology may offer opportunity for more relevant reports.

Define your information needs in terms of reports. Look at all reports that you now use or may want. Each contains data elements. The total expense for office supplies may show up as a data element on a monthly financial report. Other financial accounts will have the corresponding data elements on this report. Describe the source for each data element on each report. For example, the total monthly office supplies expense comes from the expense vouchers for the month.

When do you want each of these reports? Monthly? Quarterly? Daily? Yearly? Now and then? These are the report frequencies. Describe your reports in terms of the data elements they contain and the frequency of the report.

Is each report really needed? Does it support the decisions which are essential to the organization?

Look at the reports used by key positions in the organization. Analyze them. What decisions do they support? What data elements do they contain? Where do they come from? How often do you need the report in order to make the corresponding decisions? Do they serve a useful function? In the context of newly applied information technology such as computers, functional information can take on radically different and more effective forms over traditional information.

The process of defining functional information needs (sometimes referred to as developing a management information system) inevitably affects the flow of information from one position to another. It requires clear lines of supervision and clear job descriptions. The process intimately involves those responsible for personnel and administration. Staff and their supervisors should support each other in this process. It requires open dialogue and a willingness to freely discuss fundamental issues.

Only after this process has been concluded can modern information technology truly be applied to meeting functional and operational information needs of an institution. Once initiated, the process should never truly be concluded since we live in a dynamic changing world. The institution's statement of purpose should be reviewed regularly, and functions of all positions in the institution reassessed in light of this purpose. Information needs should constantly be redefined and streamlined, focusing strictly on the needs of the position.

3.2 Software Considerations

Based on your needs definition, consider the commercial applications software packages that are available. They may meet your needs quickly, easily, and cost effectively. If they do not, you may need to consider custom-developing applications.

Standard Commercial Applications Software

Standard Business Applications

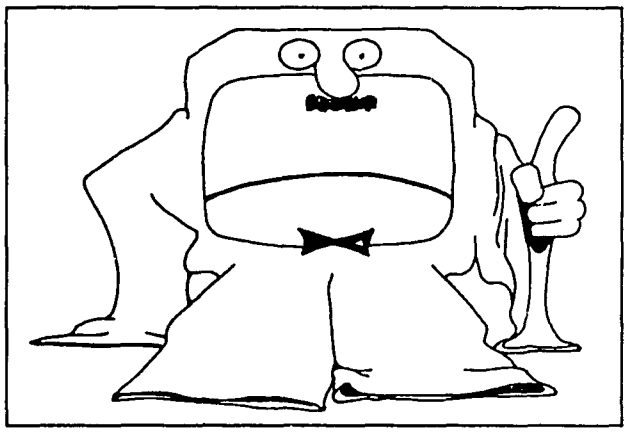
All standard business applications have now been programmed. These programs are available as commercial packaged software. In most cases users can install the software and begin using it with little or no training. The software may be relatively low cost since it is sold in high volume.

Word processing is an example of an application where many fine commercial software packages are available. Few organizations, if any, would ever need to custom program their own word processing application software.

The features of word-processing applications are highly standardized. Some word processing packages emphasize some features over others. It is merely a question of what package may be most suitable. Novelists would not need the features that allow them to incorporate graphic images into their writing. An organization which publishes a newsletter may need such a feature. There are many good commercial word-processing packages available from which to choose.

Accounting for a small or new business may be very standard, and an existing accounting package may be suitable. However larger organizations, or organizations whose businesses are unusual may not be able to find a commercial package that will suit their needs.

Each business is different. Selecting commercial, off-the-shelf packages may be like selecting off-the-rack clothing. If you are a standard size and shape or the clothing is something casual, the clothing may fit fine. Sometimes the clothing may not fit quite right. Under those circumstances you may want to consider more expensive customized or tailored software.



Will Your Software Suit You?

Read the reviews of this software as presented in computer magazines. They can provide an excellent guide to good quality commercial software packages.

Electronic Spreadsheet Applications

Electronic spreadsheet software can be applied to many business data processing needs. This software is useful where standard paper ledger or acccounting sheets and electronic calculators are useful.

Look for areas where people are adding lists of numbers repeatedly. Payroll is a common example. This is an ideal application for an electronic spreadsheet. Here you may enter once the names of all the employees in the first electronic column. In another column you enter their base salaries. In another column you enter the formulas which calculate taxes and similar

deductions. The formulas automatically calculate these amounts from the base salary column. You can enter deductions into other columns much the way they are done on paper ledger sheets. When all the figures have been entered, you may print out the results. You may even print out individual pay slips from the same information.

Next month you need only change the deductions, add the new employees, and make other deductions. The electronic spreadsheet will automatically recalculate everything. You do not need to re-enter all the employees' names or base salaries. You only need to change the fundamental data and formulas that need changing.

Electronic spreadsheet software also can manage lists of items in inventory, sort the lists, and even perform rudimentary database management operations.

Electronic spreadsheet software requires moderate to extensive training to use effectively.

Database Management Applications

Database management software structures data in sets of records where each record contains standard data elements, called fields. A common example is an address list. Each address card is a record. Each record may contain fields for name, street address, city, state, country, zip code, telephone. Some databases may store additional information to meet special needs.

There are three main aspects to database management applications:

- Data definition. This aspect often requires professional consultants and specialists.
- Programs and procedures. Once data is defined, programs and procedures will be required to manipulate the data. This is where database management software is applied.
- Query definition. Here you may define reports and seek ad-hoc answers to questions based on the data. The database management software may include powerful routines to help do this.

A database management application, therefore, includes a clearly defined set of data, comprehensive computer programs, and manual procedures for maintaining this data, and a set of reports and procedures for analyzing the data.

One power of database management software lies in its ability to easily sort data based on any field characteristic. Obviously, you may find it useful to see a list of addresses sorted alphabetically by the individual's name. However, it would be difficult to manually sort the list

by country first and then by name within the country. A computerized database management system would be able to do this within seconds, even for a database containing millions of records.

Additional power lies in the computer's ability to filter out a group of records that match criteria you set. Perhaps you only want to print labels for people who live in a specific city and on a specific street. A computerized database management system can do this is seconds. Manually, someone would need to look at each address card.

Other standard database software features include the ability to add any numeric fields and rapidly search fields. Computerized databases can be easily merged with other databases.

Clearly, this type of software may be useful in inventory management.

It also may provide a full programming language such that the data you store can be manipulated precisely to meet your needs. This is a common programming environment for customized applications development.

Communications Software

We will discuss communications and computers in detail under Chapter 7 of this guide. As with word processing, there are many good commercial communications software packages available. Standards are clear. The most appropriate package will be one which is widely used in your area.

Communications software requires little training to use. However, initially it may take extensive training or outside consulting assistance to get your communications links established.

Customizing Software

Look first to standard commercial software packages to meet your needs. Plan on even investing in one or two of them to see if they may be appropriate. See if they "fit." Consider setting them aside if you conclude that they will not sufficiently suit your needs. Budget for this time and cost.

Hybrid Applications

In some circumstances you may find a standard commercial application which you can modify. In this manner you can avoid re-inventing expensive programs that are already pretty standard,

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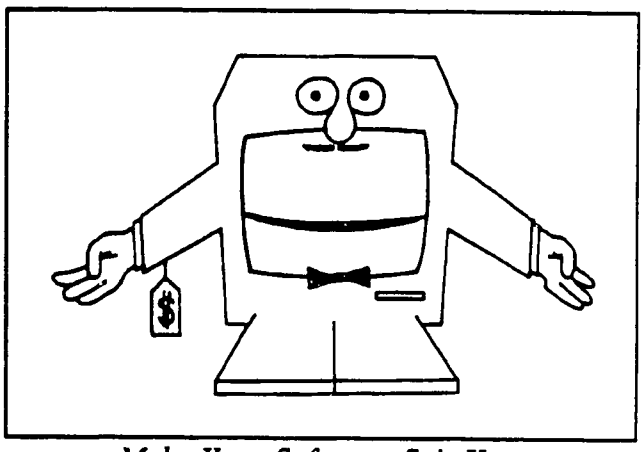
while meeting your own unique needs.

It may be expensive to modify these packages, although less expensive then a full customized system. Programmers often have a difficult time working with code that they themselves have not written. Be sure your programmer clearly documents any modifications. You will need this documentation when your programmer leaves you!



Make Your Software Suit You.

Customized Applications

The first factor to consider is the high cost of customized applications. Typically, a customized accounting system for a medium-sized organization may require months of systems analysis and documentation, programming, installation, conversion, training, and testing. The overall process may extend into years. In the United States the costs will often exceed $10,000.

The next factor to consider is the likelihood that qualified systems developers are available. It is difficult to judge system development qualifications. Programmers may often have excellent programming skills but lack the systems analysis and business experience to apply them. You may find yourself with an expensive customized application whose fit is as sloppy as any of the commercial applications. Its cost will be much higher, too.

Another factor to consider is the time customized systems development will require of your management and staff personnel. During the design phase, the developers must learn all the details of your business so that they may draft an appropriate design. Authorized representatives of your organization must understand and authorize the design. If the design is inaccurate, you cannot blame the system developer.

If you or your organization are new to the field of computers, avoid committing yourself to developing customized software. If you become convinced that customized software is the only reasonable approach for you, review this section carefully.

3.3 Operational Applications

Operational applications include accounting, inventory, and a variety of database management systems. Graphics software can provide the ability to analyze and present information effectively.

Accounting

Accounting procedures were among the first ever to be developed as a computer application for business. It is logical that you should seriously consider focusing on your accounting procedures as an immediate and appropriate area for computerization. (See discussion in this chapter on commercial software vs customized software.)

When individuals repeatedly add long lists of numbers, it is likely that their activities can and should be performed by a computer application. Clearly, this will be the case with most accounting functions.

Accounting staff will be relieved of repetitive tasks which require no imagination or human judgment. Their job function may evolve to one of interpreting accounting information using human judgment rather than processing accounting data into that information.

Inventory

Inventory management is another classic area. Here your staff maintains many inventory cards. They may also repeatedly add long lists of numbers. This is clearly a database management system.

You may find computerized inventory systems included as a module integrated with the accounting software. When inventory enters or exits the warehouse, the software may automatically update the appropriate accounts. It also adjusts the quantity on hand.

Databases

Most businesses maintain at least several databases. We described an address book database earlier. You may need such a database for members of your organization. The application can print out mailing labels when needed. You can use the database in combination with a word processor to print out customized form letters.

Customer databases may be an important marketing tool. Inventory is another important database described earlier. It is closely related to accounting. Databases are maintained by international marketing firms, tracking wholesale prices of various commodities. These can be transferred to your computer system and updated using communications software.

Graphics

Graphics applications may be important. Some spreadsheet and accounting software include the ability to view and print graphic representations of data. Special graphics software will help you compose, modify, and print graphs and illustrations for presentation reports.

3.4 Management Applications

Management decisions can be supported with special data-processing applications. These include computer "modeling." A computer model will allow you to change factors on which you base a decision to anticipate a likely outcome.

Management Decisions and Information, an MIS

All decisions are based on some form of information or understanding. All information and understanding is based on some form of raw data input.

A management information system's (MIS) purpose is to collect and store appropriate data and to process it into meaningful information. This information can be used as the basis on which decisions are made for management functions of planning, organizing, directing, controlling, and staffing an organization.

Important components of an MIS are "Decision Support" applications. These may be designed to specifically support ongoing operational decisions (such as budget control) or may be a set of data processing "tools" that can analyze available data quickly in a wide variety of ways to support many unforeseen decisions.

For example, imagine that you are faced with the following dilemma:

> Just prior to planting time for your member's main crop, you learn that the international market price has fallen dramatically. What should you advise them to plant?

Clearly, in this example you require information on which to base your decision. The information will help to answer such questions as:

- What crops have we planted over the past five years?
- Which crops have generated the most profit for our members?
- What is the current international market price for these crops?

Computer communications applications can help you gather data. Database management applications can help you store and manipulate it. Electronic spreadsheet applications can help you analyze it. These are the tools you use to make decisions. Taken together they are your MIS or decision support system.

Keep this concept in mind while developing your computerization strategy. Standard operational applications will provide you with the information you need for making daily decisions. Invest in the staff skills and in the software you need to help you make the unforeseen decisions, too.

Computer Models - What/If Analysis

Some computer applications are designed to permit you to project results based on a set of current factors. This is called a computer model. Electronic spreadsheet software often contains sophisticated functions that will help set up computer models, especially financial models.

For example, you may be facing a decision about whether to lease or buy equipment. You need to project into the future and estimate what your total costs will be under each of those options. In a computer model, you may enter the leasing information and automatically calculate the total cost to you, including interest and estimated maintenance costs (if any under the leasing agreement) over the declared life of the equipment. To do this manually might require dozens of calculations on a calculator and several pages of note paper.

Then you enter the purchase price, financing costs (if any) and maintenance costs over the same time period. You provide the formulas that the electronic spreadsheet will use to calculate results.

You can now compare overall costs given these two options under the terms and estimates you provide. The power of this computer model is that you can change any one of the terms to automatically and immediately see what the effect is on the end results. Consider whether the interest rate for financing the purchase is adjustable based on floating bank rates. You can try different estimates of what this average interest rate may be over the life of the loan. Similarly,

you can change the estimated average annual maintenance costs under the leasing agreement and under the purchase plan.

Now you can base your decision on your best judgments about what terms will affect the equipment life and use. You can test your options immediately without laboriously recalculating results.

Consider sales projections as another "what-if" computer model. Enter into the electronic spreadsheet a production estimate, a percentage sales, a sale price. A formula will multiply the estimate times the percentage sales times the sale price to arrive at gross sales value. Now, try "what if the production estimate decreases?" Lower the production estimate. The spreadsheet formula will instantly recalculate the gross sales. You can immediately see what impact it will have on gross sales, assuming price and percentage sales remain the same. Try "what if" on any combination of these three factors. You can do this operation on a calculator with a little more difficulty. When the terms and formulas become more complex, it becomes almost impossible to use only a calculator. Try making the production estimate dependent on estimated rainfall. Now change the estimated rainfall and see the resulting impact on your estimated production and gross sales.

Computer models can also graphically display the results of set of options. Imagine that you can see the effect on gross sales for each drop in total production of a certain percentage.

3.5 Networks and Operating Systems

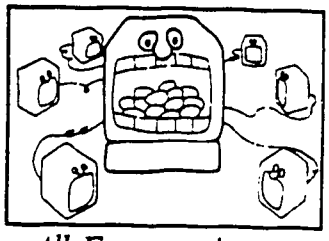
Will you be using more than one computer in your office? What, if any, connection should there be between them? How many computers will you be using next year, in three years, in five years? Should they be linked together somehow? These are fundamental questions that will guide your computerization strategy.

Network Considerations

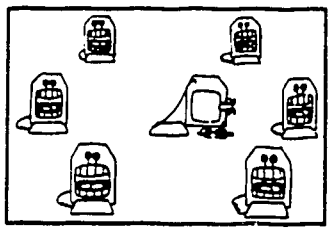
Local Area Networks (LANs)

Personal computers (PCs) were originally designed for personal use. One person uses them. As business began using them more, linking them into networks became an obvious strategy. In this way users can share expensive devices such as printers, plotters and modems. A LAN is a set of two or more PCs linked together.

Users in a LAN can also share data and software. LANs may use a single powerful PC as a "client-server." The client-server PC contains all the software and data used within the network. Users may or may not have their own hard disks. When the central facility fails, the entire data processing capability of the organization is lost. All eggs are in a single basket. It is more vulnerable to disasters such as earthquake and fire.



All Eggs are in one Basket

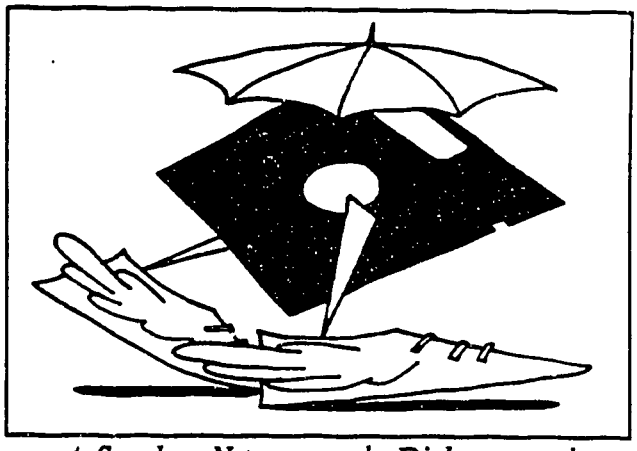


Eggs are in Different Baskets

Some LANs are designed so one user can use the software and hardware found on the hard disks of any other user in the LAN. All users have their own hard disk within their own PC. In this case, all the eggs aren't in one basket. If one PC in the network crashes, the others may be unaffected. However, it is more difficult to share software and data in this type of network.

Informal Networks

Many organizations have and use this type of microcomputer network without even realizing it. It costs nothing in addition to the microcomputers. It requires little, if any, additional training to use. It is a decentralized network. Each machine can and does act independently of any other. However, you can exchange data easily between machines.



A Sneaker-Net uses only Diskettes and Sneakers.

It works by copying data onto a diskette. Hand the diskette to someone wearing shoes (sneakers for speed.) They carry the diskette to another computer or other computers. The data is copied from the diskette to the other computer's hard disk. The "sneaker-net" is complete.

This may be an ideal network for organizations who are receiving computers for the first time. It is safe because each computer works almost completely independently of any other. If one fails, the others are left untouched. Data can be analyzed on one without risking contamination to the original data stored and maintained on another.

This may be an excellent arrangement in difficult environments where heat, dust, and humidity are serious problems. Should one computer fail, the other could serve double duty.

A fancier arrangement can be designed using a cable and special software that can efficiently move files between computers. Such cables and software are relatively inexpensive and were originally designed to facilitate file sharing between laptops and desktop computers. This is not a true network but can be efficient for sharing data.

Operating System Languages

An operating system is the primary computer program for any computer. The operating system is running when no other program is running. It performs the basic procedures for the computer's operation and provides the means for executing other application programs. It links the microprocessor with the computer monitor, the printer, the hard disk, floppy disk drives, random access memory and other devices. It directs the computer's operations and allows the user to manage software and files in a fundamental way. It responds to a user's instructions to run an application program by loading the program into RAM and following the program's instructions.

Applications programs must be written specifically to run under specific operating systems. Be sure that any commercial applications software you want to use will run under your operating system. Be sure that the computer model you purchase can run your operating system.

Stand-alone Microcomputers

These computers are often referred to as "personal" computers. They were designed for use by one individual using one application software at a time. The operating system most widely used is called "DOS," which stands for disk operating system.

Operating systems for personal computers work well when one application is running at one time and when primarily one user will be assigned to it. They have no built-in protection for multi-user operations. Usually, anyone who can turn on the computer can use any of the programs found on it and can have access to any of the data stored there.

These operating systems do not easily handle multi-tasking. Multi-tasking refers to several applications programs running simultaneously on the same machine. You cannot easily tell the computer to begin preparing a report based on a database, then start another program before that one has been completed.

"Windowing" refers to the attempt of some applications and operating systems to accomplish multi-tasking on a microcomputer. They open a "window" on the computer screen for each task or software you begin. You move from window to window to resume work on each task.

Microcomputer Networks

As organizations began using many microcomputers at once, it became obvious that there would be some benefit to linking them together.

Microcomputers are designed to work by themselves. They usually will have their own printer. However, most of the time the printer may sit idle. Nearby, you have another microcomputer, also with a printer which sits idle most of the time. Managers realized that they could use their equipment more efficiently if they could share devices, like printers, between several microcomputers.

After a "sneaker-net" this is the easiest and most cost-effective network to set up and maintain. With the sneaker-net concept, you might set up one computer station and dedicate it to printing. Individuals prepare their documents on other computers which have low-cost draft printers or no printers. They copy their files to a diskette and take it by foot to the printer station.

You can purchase and install hardware devices to link one printer to several different computers. Similar devices can link one modem or other computer peripherals to several different computers.

In fact, many people do not consider this any sort of a network at all. They consider it as simply a means of sharing equipment between computers that are essentially stand-alone machines. They claim that a true network must share both data and software in addition to equipment (such as printers).

Special operating systems have been designed to replace DOS or work with DOS to permit full sharing of all data, software, and equipment between microcomputers. These systems provide for multi-user and multi-tasking activity to varying degrees. Typically they include some form of password control protection for data and software.

These PC based networks are common. They are flexible, relatively low cost, and easily upgraded. However, they often require the full time and attention of a system supervisor.

Mini and Mainframe Systems

The distinction between micro, mini, and mainframe computers is vague. Microcomputers are now so powerful that they can serve as a minicomputer host. The distinction is now more a question of how a computer system is used, not on how large or how powerful it is.

Mini and mainframe operating systems are designed specifically for many people using the same data and software at the same time. Clearly, it is a situation where multi-tasking and multi-user access takes place. Therefore, they are good systems for use where a centralized architecture has been adopted. They have extensive security features to protect data and control access. They can take greater advantage of hardware memory capacity than a personal computer operating system.

A common operating system in use for these systems is called Unix. It will run on many microcomputers such that they can be used as the host "minicomputer." Multiple users can use the same host computer from terminals. Their terminals consist of relatively low-cost monitors and keyboards. Users have access only to data and hardware that exist on the host computer.

Some computers are designed only for multi-user "mainframe" environments. They typically are large, expensive, and have operating systems and applications software that is designed to run only on themselves. These are highly centralized operating systems with all the advantages and disadvantages discussed earlier.

Write in the space below. What operating system might be best for you? Use pencil.

Write applications notes below. What questions do you have about hardware? Use pencil.

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Chapter 4: Hardware

Once you have defined your intended applications and selected your software, network (if any), and operating system, you are ready to consider hardware. Certain general specifications will apply to almost any configuration. Consider carefully maintenance factors when selecting hardware. Computer technology will continue to advance rapidly in the future. This will have an impact on your strategic plan. Laptop and desktop portable computers now offer significant advantages for some applications and locations.

4.1 Selection Criteria

Define Needs -> Select Software -> Select Hardware

Develop your hardware selection criteria based on the software you have selected to meet the needs you have defined. This is often the reverse of what many managers do. They first find the computer they like based on reputation, cost, or other criteria. Then they purchase it and try to make whatever software that it comes with work for their business. They will even change the way their business works in order to use the software. Rather than liberating them, the technology starts to shape them and their business into something it, the technology, can handle. They feel limited, trapped, and frustrated.

Start first with your data-processing needs clearly defined. Then select the software that best meets those needs. Decide on what kind of network architecture is appropriate (if any) and be sure the operating system will handle your network requirements and run your selected software. Then and only then are you ready to really define your hardware selection criteria.

Basic Hardware Specifications

Network Architecture

Your first specification should be based on your chosen network architecture. If you intend to purchase only one microcomputer, then there is no further consideration along these lines. If you operate critical applications on one computer, be sure you have reliable repair people nearby who can fix your computer quickly. You may want to consider buying two computers of the same type, using one as back-up to the other.

For a multi-user network, specify how many users must have regular access to the system. Will you need one terminal for each of these users?

How many client servers will you want? Consider the network architecture. You may want a combination of these designs by linking client servers using a bridge. Perhaps you want each

terminal to be a stand-alone computer in a network, acting as its own file server. Some operating systems work well for small (ten or less terminals) networks.

Microprocessors, Operating Systems, and Speed

The microprocessor is the heart of any computer. Operating system software is programmed specifically to run on particular microprocessors. Verify that the operating system you intend to use will run on the computer you purchase.

Microprocessors and related electronic architecture also define the speed of the computer. Speed is measured in cycles per second of the computer clock. The clock acts as a traffic policeman so that instructions and data move through the microprocessor in an orderly fashion.

The earliest microcomputers worked at a speed of 4.77 megahertz (million cycles per second). Stand-alone microcomputers for most applications work fine at 12 megahertz.

Client servers (also called file servers) in networks should be the most reliable. Low speeds may work fine if the network is small and the data processing requirements modest. Plan for growth, though. Purchase the highest speed you can afford for file servers.

Data-Storage Capacity

You may need to consult with a professional systems analyst to determine this specification. Data is usually stored on some form of hard disk magnetic media. Your data-storage requirement is the total of the size of all your operating system and program files plus all the data you will ever need to have available at any one time. Large inventory programs may require many megabytes (one megabyte equals approximately a million characters of data).

Typical stand-alone microcomputers should have at least a 40-megabyte hard disk; 80 megabytes is not too large.

Microcomputers that will serve as host file servers in a network may easily require a hard disk over 150 megabytes. You may want two hard disks of the same size in the same machine. One will mirror the other. If one fails, the other will continue as an automatic back-up. More users in a network will mean that more data may be entered and stored. More software may be stored to meet the wider demands of multiple users. Financial and inventory applications may accumulate several years' worth of transaction data. After that, you may choose to copy the oldest month's data onto diskettes and delete it from the main hard disk.

Your data processing requirements may suggest the use of CD ROM equipment. CD ROM means compact disk read only memory. A CD ROM is a laser-written optical disk which may contain massive quantities of information. Once written it cannot be erased. It provides fast access to software and data which you never need to change. CD ROM is important for research and reference applications.

Discuss this specification carefully with your hardware and software vendors. It is costly to increase your hard disk size later. Give yourself generous hard disk capacity at the beginning.

Random Access Memory (RAM) Requirements

RAM is the electronic memory where your computer actually does its processing. It must be large enough to hold both the software and the portion of data it must process at any one time. Generally speaking, the more RAM you have the faster your system will operate. Some operating systems will not automatically use large quantities of RAM. You often will need utility software to take advantage of RAM beyond 640 kilobytes. When RAM is small, the operating system must read from and write to the hard disk more frequently. This slows down overall performance.

In a stand-alone microcomputer most dealers recommend a minimum RAM specification of 640 KB. Standard spreadsheet, database management, and word processing applications software require this amount of RAM. Most microcomputers now come with at least one megabyte (MB) of memory as a standard.

If a microcomputer is being used as a client server in a network, you may need extra RAM. This is a general guideline. It depends on the type of network and the type of data processing.

Printer Requirements

Printers are primary output devices (besides the monitor). Decide what the purpose will be for any documents you print. Will they be formal reports? How neat and clean should they be? How many pages will they contain? Will they contain simply characters or also graphic illustrations? How many pages will you be printing in an average day? Will you be printing many columns of data such that you will need wide paper?

The most common printer is a dot matrix printer. For most computer printing a 12-pin dot matrix printer will be adequate. A wide-carriage version will permit you to print spreadsheets easily on wide paper.

For more formal reports, a 24-pin printer may be worthwhile. It will print faster and with clearer type. Documents will be perfectly acceptable for most marketing and formal correspondence.

Laser printers are expensive and fast. They also consume more electricity. They are appropriate if you will need to print large quantities of formal material regularly.

Plotters are printing devices that draw graphs. They usually can draw in multiple colors. They are specialized devices which meet only specialized application needs.

Inkjet printers are fast, quiet, and provide clear professional-looking documents. However, the ink may have a tendency to smear. Their cost is higher than a dot matrix printer but less than a laser printer.

Monitor Requirements

All monitors require some type of card. The card fits in a slot on the motherboard.

Naturally, the least expensive monitor is monochrome. It displays only one color on a black background or black on a single color background. Monochrome monitors usually are available in green, amber and white. Some people find an amber screen monochrome monitor easier on the eyes than a green screen monitor. Others find black and white monitors easiest.

The least expensive monochrome monitors will not display graphics. You may be seriously disappointed if you do not have graphics capability. Most standard commercial software packages now depend on this capability. Some word processor software use graphics to display a preview of a page layout. All desktop publishing software requires graphics. Spreadsheet software uses graphics to display graphs, of course.

Resolution is another important specification to consider. Low resolution means that characters will appear on the screen with a "boxy" appearance. It is sometimes called the staircase affect. Diagonal lines look like stairways because they are formed of little boxes.

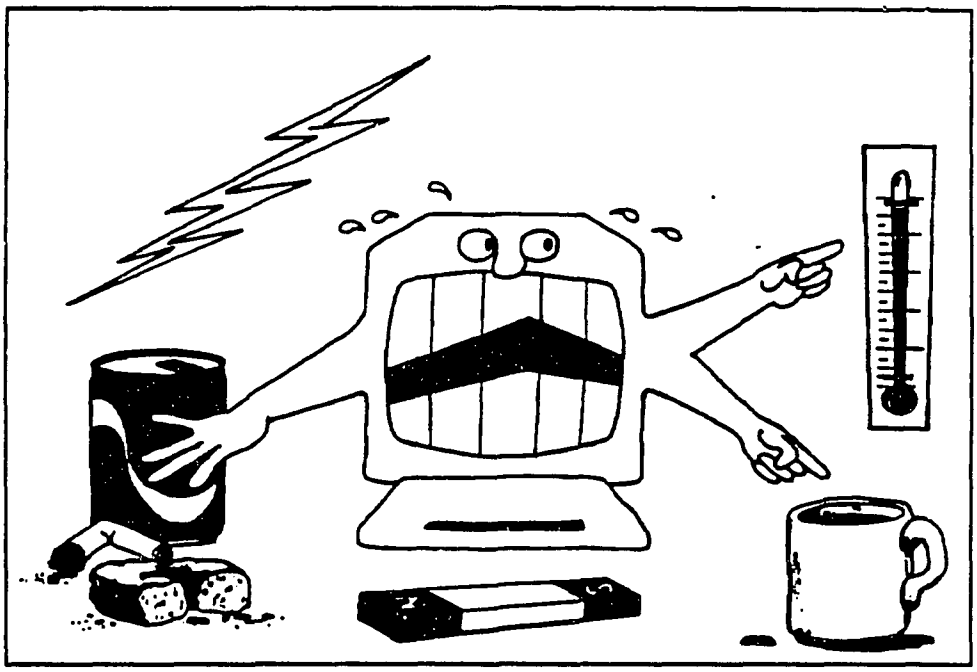
High-resolution monitors provide crisp, clear characters. Partly this is a question of personal choice. Partly it is a question of eyestrain. Cost is always a factor to consider. Usually, the higher the resolution, the higher the cost.

Most commercial software applications will work on both monochrome and color monitors. Some software makes effective use of color. Computer users prefer color if they can afford it.

After all, when you spend so much time looking at something, some variety in its color can be refreshing.

Monitors can affect computer speed. A fast computer may be slowed down by the monitor it uses and the amount of video memory on the monitor's card. To receive optimum performance from a fast computer use a high standard monitor with maximum RAM on its card.

4.2 Maintenance Considerations



Some Environmental Hazards for Computers!

Environmental Factors

Heat, dust, and humidity can seriously reduce the effective life of your computer equipment. They are discussed in greater detail under Chapter 6 System Management.

Some computers are more sensitive to heat, dust and humidity than others. Large mini and mainframe type computers require strictly controlled environments. Even slight changes in humidity and temperature will distort the hard disk media such that the data will be lost. Dust can obstruct ventilation ports leading to overheating.

Microcomputers are much more durable. They will work in relatively widely varying conditions. However, their life span will be significantly shortened by hot, humid, and dusty conditions. Some computer manufacturers may produce "industrial standard" microcomputers designed for use in harsh environments.

The most durable type of computer may be the laptop. These are now so powerful that they really function as desktop machines that happen to be so small as to be portable. They consume little electricity and so generate little heat of their own. They do not require a cooling fan, and so draw less dust into their circuitry. We will discuss the advantages of these machines under a section 4.4 of this chapter.

When considering hardware, consider the environment in which it must operate. Ask the vendor what the computer's environmental operating specifications are.

Electrical and Magnetic Concerns

Unstable electrical supplies may be the greatest cause of computer problems. As with environmental factors, the big centralized mainframe-type computers are the most sensitive. They will require sophisticated power regulators which also will provide continuous power during a blackout or brownout.

Microcomputers are less sensitive to power fluctuations but are still significantly at risk.

Laptop computers are designed with built-in protection against power fluctuations.

You can usually find power ratings on each item of equipment, along with the model and serial number. Tolerance and operating specifications are usually found in the operating manual for that equipment.

Voltage Standards

There are two primary voltage standards in the world. One is a nominal 115 volts at 60 cycles. The other is a nominal 220 volts at 50 cycles. Voltage is a power rating, and cycles refer to the frequency at which the current alternates. Frequency is not important for most electrical devices. Voltage is important. A light bulb designed for 115 volts will burn out almost instantly at 220 volts. You can imagine the impact on a computer!

If you are importing computers from another country, it is important to know first what voltage standard exists in your own country. Microcomputer system units often contain power supplies that can be switched between these two standards. However, monitors and printers do not.

Transformers

An electrical transformer can change the voltage from one standard to another. A "step-up" transformer changes a low voltage to a high voltage. A "step-down" transformer changes a high voltage to a low voltage. Some transformers are two-way; they function as both step-up and step-down depending on how you use them.

Transformers are effective devices for using computers which operate on one standard in countries where the power is supplied at another standard. Typically, a 500-watt transformer will be powerful enough for a stand-alone microcomputer, monitor, and printer. Larger microcomputers, such as those used as file servers in a network or minicomputer environment, will require at least a 1000-watt transformer.

Laptops can use a small transformer. Usually 100 watts is sufficient. Many laptops can use a "universal power adaptor." Universal power adapters now accept voltage between 100 and 250 volts and either 50 or 60 cycles. They need no additional transformers. They can even use a transformer device which plugs into the cigarette lighter of a car.

Some transformers allow the user to monitor and adjust the output voltage. When input voltage drops or rises, output voltage drops or rises. The adjustment will provide a higher or lower output voltage relative to the input voltage. This is a manual voltage-regulation system. It is not effective; the user would need to monitor the voltage meter continuously and act quickly to correct a voltage change.

Automatic Voltage Regulation and Line Conditioning

Voltage standards are "nominal." They often fluctuate above or below the nominal rating. A 10 percent fluctuation is easily tolerated by most microcomputers. Laptops have even a greater tolerance, especially if they are using a universal power adaptor (100 volts to 250 volts tolerance.) Mini, mainframe and file server computers may tolerate only 5 percent tolerance. Check with the hardware specifications.

Where voltages vary widely an automatic voltage regulator (AVR) may be a useful device. Within certain ranges they can correct voltages. They can be used with transformers to help provide steady and correct voltage.

However, when voltage fluctuates beyond the regulator's capabilities, damage may occur in the regulator and even in the computer.

AVR's are designed with power rated in watts. Their power rating should match that of the transformer with which they are used or match the combined power ratings of the equipment they will support.

Line conditioners may combine voltage regulation with other protection from electrical "noise." Electrical noise distorts the general characteristics of the power source. These distortions may include brief spikes of high voltage. Spikes may last only one or two cycles, one- or two-fiftieths of a second in a 50-cycle environment. This is too brief for AVRs to correct. Surges of voltage last longer and may be corrected by the AVR. Distortions may also appear as fluctuations in the frequency of the voltage.

Stand-alone microcomputers and laptop computers have a relatively high tolerance for line noise. However, high spikes can damage computer equipment and/or lead to loss or corruption of data.

Back-up, Standby, and Uninterruptible Power Supplies

These devices provide varying degrees of protection against fluctuating voltage, brownouts, and blackouts. They may include line conditioning and voltage regulation features.

A back-up or standby power supply feeds normal electrical power to the computer from the wall outlet. It monitors the voltage level. When the voltage level drops below or rises above a specific point, it automatically switches the computer to battery power. The batteries may be similar to those used in cars. When normal power is restored, the device switches back to feeding the computer with power from the wall outlet. It uses the wall outlet electricity to recharge the battery.

Standby power supplies such as these work well for many computers. They must switch quickly to battery power before the computer even senses the interruption. Sometimes they also include some form of automatic voltage regulation.

True uninterruptible power supplies are sometimes called "online" power supplies. They are more expensive than standby power supplies. They provide electricity from batteries all the time. When wall outlet electricity is present, the online power supply maintains or recharges its batteries. However, the batteries are "online" all the time. No switching takes place. Their main advantage is that the electrical output to the computers is a nearly perfect voltage all the time.

Many people refer to all these devices as "true" UPSs.

Power is measured in watts or volt-amps. A standard PC with monitor and printer will use between 400 and 500 volt-amps. Check the specifications to be sure your power protection devices are sufficiently powerful to meet your needs. Total the power rating of all your devices to determine the power rating for your power protection.

Chaining Power Devices Together

It is possible to chain power devices together. For example, a transformer may be connected to the wall outlet, an automatic voltage regulator may be connected to the output of the transformer, a UPS may be connected to the automatic voltage regulator, and the computer equipment may be connected to the UPS.

Some UPSs are sensitive to the frequency of the alternating current. For example, they may be designed to operate on 60 cycle 115 volt equipment. They may not work correctly if they are used with a step-down transformer in a 220 volt 50 cycle environment. The reverse situation may also be true. This depends on the electronic design of the UPS.

Similarly, some UPSs will not work well with automatic voltage regulators. Check with the manufacturer's specifications and recommendations.

Risk from Magnetic Fields

All wires through which electricity runs create a magnetic field. Usually, they are weak and cause no disturbance. However, strong magnetic fields may distort the monitor's display, damage or erase data on a hard disk, and completely erase data on diskettes.

Avoid using magnets anywhere in a computer room. Monitors generate a brief, strong magnetic field when turned on. Do not place a diskette against a monitor screen when you turn it on unless you want to erase its contents. Similarly, do not place a telephone on top of a diskette. When it rings, it may generate a strong magnetic field.

X-ray machines do not generate a strong magnetic field. They will not harm diskettes or other magnetically sensitive media.

Preventive Maintenance

The old saying, "an ounce of prevention is worth a pound of cure," applies especially to computer installations. Regular preventive maintenance and thoughtful operations procedures will significantly add to the life and reliability of your computer equipment.

Regular Cleaning of the System Unit

Dust is an acidic substance. It eats away at the metal legs on microchips and can eventually destroy them. It also clogs vents and contributes to overheating. Dust accumulates inside the system unit.

Use some form of dust covers. Even a cloth dust cover will provide significant protection.

Insects may invade a system unit, especially in tropical climates. The system unit provides warmth and shelter. Their activity can clog vents, short out circuitry, and clog drive motors.

Regular cleaning of the inside of the system unit is a worthwhile procedure. With minimal training most people can do this. An experienced hardware technician should provide this training if available. The basics are:

- Back up all your data first. Take the cover off of the system unit. Blow the dust out of the unit either with your own breath or with an air can or vacuum cleaner designed for this purpose.

- While the unit is open, remove all cards and rub their contacts with a hard ink erasure. Replace the cards carefully. Be sure they are firmly seated in their slots.

- Run all your software to be sure that all your connections are correct.

Laptop computers generally do not need this type of cleaning. They have no fans which draw dust into them. Be sure all vents are clear of obstructions.

Cleaning Floppy Disk Drives

Computer repair technicians disagree over this procedure. Some believe that it is a useful preventive maintenance measure. Others say it contributes to wear and tear of the drive heads. They say it should be done only as a repair procedure after a problem occurs.

I favor the latter point of view.

Floppy disk drives spin their disks at high speeds. The drive heads generally do not touch the disk medium. They read the magnetic data without touching the medium. Therefore, technically speaking, they should never become worn or dirty. Nothing ever touches them.

In reality, users may insert diskettes wrongly or use bad diskettes which occasionally result in contaminating the disk head. Therefore, from time to time cleaning may be required.

Printers

Dot matrix printers work well with little maintenance. The most important preventive maintenance is to use good quality, well-inked ribbons. These ribbons contain lubricant as well as ink. The small pins that strike the ribbon require this lubricant. Without it, they will burn out. You will require a new print-head. A print-head may cost 60 percent of the original purchase price of your printer.

Look for a supplier of self-inking ribbons. They are expensive but last as long as ten or more regular ribbons. You can add a few drops of ink when it seems necessary. With regular ribbons you face a long period when the type isn't quite as dark as you want it but not light enough to bother changing the ribbon.

Dot matrix printers collect a fair amount of dust and paper particles. Simply blow the dust out at regular intervals. If the printer is small enough, turn it upside down and shake it.

Laser printers, plotters, and inkjet printers have special, though modest, maintenance requirements. Follow the instructions in the user manuals.

Monitors

Monitors are usually neglected when it comes to preventive maintenance. They need little care. There are no user serviceable parts inside them. Don't bother trying to open one. It can even be dangerous.

The screens generate a strong magnetic field when turned on and a modest one when operating. This attracts dust particles. Clean the screen with any good glass cleaner. Use as little liquid as possible.

Keyboards

Keyboards also require little maintenance. However, take care not to let dust, crumbs from food, or other particles enter the keyboard. It will result in keys that stick or do not work.

Beverages spilled on the keyboard may short out the contacts inside. This will damage the keyboard and may also damage the system unit.

There is at least one documented incident of an ants nest found in a keyboard in Sri Lanka.

A qualified technician can take the keyboard apart for regular cleaning. Do this when you clean the system unit. Most users can learn to do this themselves with modest training.

Hard Disk Maintenance

Hard disks require and accept no physical maintenance. However, they do require periodic logical maintenance. Hard disks work by creating a map of themselves. On this map they chart the magnetic lines which define sectors and clusters. During normal operation, heating and cooling take place. Vibration, normal wear and tear also occur. As a result, the map may not match the actual location of these sectors and clusters anymore. Your operating system may not be able to find its way around. It might be like using the wrong map to find your way around a city.

In addition, normal operations may result in physical defects developing on the hard disk medium. These defects are not important. Most operating systems will recognize them and put a note on their maps not to use these areas. However, data might be stored there and lost at some point before the operating system recognizes the defective area.

A low-level reformatting of the hard disk will correct the above conditions by re-drawing the logical map of the hard disk. Special software utilities are available to do this. Users can learn to use this software with minimal training. The software utility can usually preserve the data on the hard disk even as it reformats it.

It is essential to back up all data immediately prior to reformatting the hard disk.

Repair Considerations

Each country and each city has different resources. Consider the hardware technicians, consultants, dealers, and users in your own area. Once you purchase and install hardware, you will be relying on your local resources to support it.

When selecting hardware, consider how easily it might be repaired. If you import the computer equipment, where will spare parts come from? How available will they be? How much experience do local repair resources have on this equipment?

Perhaps computers are much more expensive when purchased through a local dealer. They may be cheaper if imported directly or ordered through the mail. However, warranties may be

useless on imported equipment because the cost of returning it may be too expensive. Local dealers may object to servicing your equipment since you did not purchase it through them.

Purchase locally if service resources are scarce. If there are many service resources, check with other computer users to see what equipment is widely known and understood. Try to use equipment which is standard, for which parts are easily available, whose architecture is well-known.

Some service resources offer maintenance contracts. These usually work like insurance. You pay a certain fee in return for which the service resource guarantees labor and maybe parts to repair your computer during the contract's term. The peace of mind may be worth the expense. Generally, you will save money over time if you can find a reliable service resource who will bill you fairly for parts and labor on an as-needed basis.

Be sure to budget for these expenses. A general guideline is to budget 10 percent of the purchase price of all computer equipment for repairs each year. Include printers, monitors, UPSs, and other computer peripherals.

4.3 A Look into the Future

More Power, Less Cost

There is a general trend in the electronics industry towards greater and greater power, at less and less cost. The implications are that you may want to plan on replacing or upgrading your computer system eone or two years. In this way you can take advantage of new, faster technology at the same cost you may have paid for the older technology.

Let Others Test Newest Technology

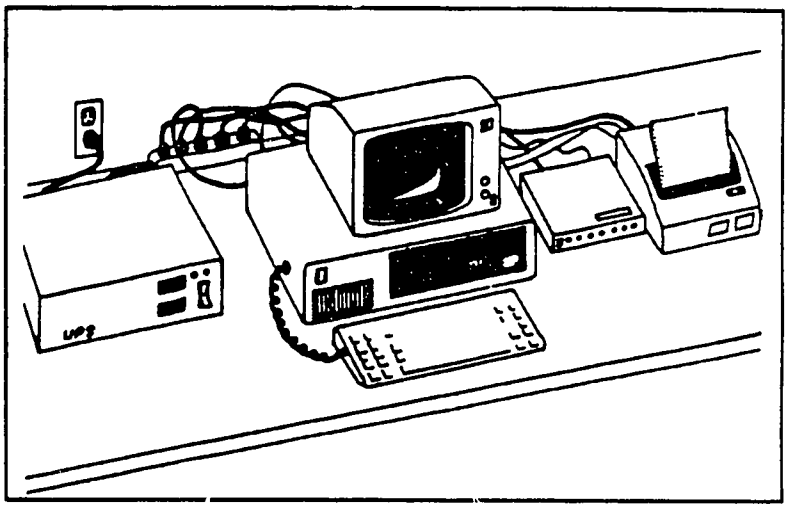
The newest technology is always the most expensive and the most risky. Aim for the models that have been out for a year or more. Let others test the newest technology.

Never buy version 1.0 of anything!

4.4 Laptops and Desktop Portables

Advantages

Laptop computers and portable computers are now so powerful that they can be considered desktop portables. They offer significant advantages over equivalent full desktop machines, especially for use in difficult environments. They include:



Desktop Systems Require Many Components

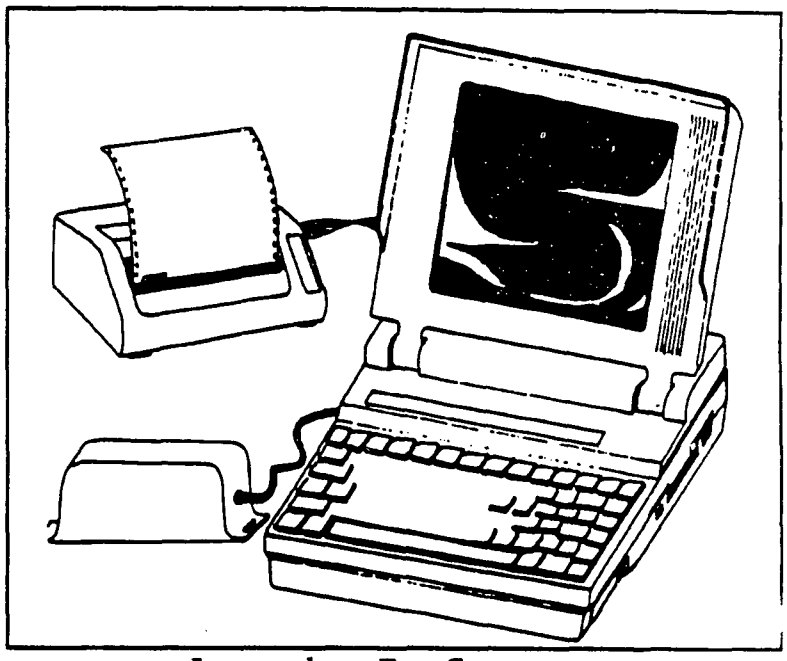
- Low shipping weight, hence low shipping costs;
- High reliability (resistant to heat, dust, and humidity problems);
- Virtual immunity to power problems and will work on almost any electrical standard (need no UPS, AVR, or other power protection device);
- Easy to lock up out of sight;
- May be used with standard monitor and keyboard if necessary;
- Will operate in a network environment;
- Obviously easy to move from work station to work station.

Disadvantages

They have two main disadvantages:

- They are invariably more expensive than equivalent full desktop models (but since they need no power protection devices, the costs may be close overall;)

- They generally have poor quality screens unless you are willing to pay for the most expensive models (but they can use standard monitors.)



Laptops have Few Components

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Chapter 5: People and Training

Your strategic plan will include important organizational, training, and personnel considerations. Start with defining your organization's information flow and your data-processing needs. Identify training requirements based on your overall computerization strategy. Consider training for management as well as staff. Draw on local training resources first. Plan for generous amounts of staff time devoted to self-training. Anticipate your computer-related personnel requirements. Where possible, train and promote existing staff.

5.1 Organizational Considerations

Installing a computer system in an organization can cause dramatic changes. Staff job descriptions will change. New positions will be created. Other positions will be phased out. Give full consideration to the potential impact of a computer system on your organization. Often one person becomes an immediate computer "expert" in an organization. Avoid building your computer operations around any one person. That person may leave.

Define Organizational Information Flow

Focus on the managers in your organization. What decisions must they make? Describe these decisions in detail. Write them down. What information do they need in order to make these decisions? Where does it come from? Describe this information in detail. Write down these descriptions for each decision. Keep samples of this information on hand for reference.

Consider other positions that make decisions in your organization. Virtually all positions make some form of decision. Ask the same questions. What decisions must they make? When must they make them? What information do they need? Where does it come from? Again, keep samples of this information on hand. Sketch ideas for reports that would be useful, but are not now available.

For example, the membership at the annual general meeting may have the responsibility for accepting new membership. To make this decision, they may need to know the characteristics of current membership. If the current membership includes hundreds or even thousands, then a computer may be effective at generating appropriate membership statistics.

Similarly, the managing board or committee may decide wholesale market prices for the produce they sell. They may need statistical reports showing current and past wholesale prices on the international markets to make these decisions. Charts and graphs of this data may compare those international prices with their own prices.

Departmental Information

Where they exist, each department head may repeat this above process. Note areas where people are doing work that might be better performed by computers.

If possible, reassure people that their jobs may change but they will not lose their employment. People are reluctant to give up what they have been doing. People are reluctant to admit that what they have been doing has served no useful purpose or may soon serve no useful purpose. People need to feel secure to face change. People need to feel secure to help implement change.

Over time, organizational information requirements change. However, the data-processing procedures at department and operational levels may not keep up with these changes. Look for reports which no longer are used. Look for decisions which are made based on makeshift reports or assumptions where even makeshift reports are not possible.

Information produced by each department should contribute to the organization's overall information requirements. Note where reports are produced or data gathered "because we have always done it this way." Ask repeatedly, "Why do we need this information or data? What decisions do we make based on this information?" Find out what happens to it. Who uses it? Where does it physically go?

For example, the Marketing Department may have the responsibility for gathering marketing data and processing it. Since the managing board or committee may set the wholesale prices for the cooperative's produce, this department will provide the reports and graphs that support these decisions.

Imagine, however, that a membership clerk gathers information on the size of the nose of each member. This clerk may be carrying on a tradition. They have always gathered this information. They produce a statistical report on how many members have small noses, how many have medium size, and how many have large size. Now, through this analysis, you ask, "What decision or action does this information support?" If the answer is "none," then you might well propose to drop this process. I have taken an example of a process that is probably obviously useless. These processes are difficult to find during a real analysis.

Organizational Data-Processing Needs

Each organization is a unique combination of people and procedures. Each will require their own unique combination of information and data-processing applications. Many will be appropriate for computers to handle. Accounting is a primary candidate for computer applications. Agricultural cooperatives may have particular need of international market

information, which telecommunications can provide. Inventory and stock controls are also important areas.

Word processing is the easiest application to begin using. Word processors use computers to compose, revise and print documents. It is relatively easy to understand and easy to learn. It does not require any special programming or significant changes to manual procedures. However, it may be the least cost-effective application of all. The benefits of word processing may not result in significant cost savings compared with the benefits of computerizing other functions.

Consider carefully the physical location of the first computer in the organization. If you place it where it can be easily used for word processing, it may be unlikely that accounting or other personnel will have adequate access to it.

Consider Your Organization-Wide Strategic Plan

The physical location of a computer system, as well as the application to which it is put, should support an organization-wide strategic plan. You have several options for including a computer operation within your organizational structure. Consult your current organization chart. Which of the following models may best suit your computerization plans?

We will discuss the strategic plan itself in more detail in Chapter 6.

Host Departmental Model

In small organizations one department may host the computer services for the entire organization. For example, the Finance Department may use a stand-alone microcomputer for its financial data processing. This department may assume responsibility for all data processing services. They make the computer available to other departments as needed.

This is a common approach for first introducing computer operations. Plan ahead, though. In the future you may want to establish a centralized model. Your finance department may resent "losing" their role as host.

Decentralized Departmental Model

Does each department have separate and distinct computer requirements? If so, perhaps each department will require its own computer system. Each department may assume full responsibility for training, operations, and support for their own computer system.

This is usually appropriate for medium- to large-sized organizations. They use stand-alone personal computers in each department. Maintenance, training, and support requirements are minimal.

Centralized Model

Should you create a new specialized "computer department?" This new department might hold responsibility for computer services for the whole organization. The department head would report to top management. The computer department head would be at the same level in the organization as the finance department head, the marketing department head, or the personnel department head.

This model may be appropriate in a small to medium sized organization where one or two stand-alone microcomputers will be used to handle all the organization's needs. Placing them in an independent department will provide equal access to all other departments. All departments will receive the support of the computer department staff.

This model may also be appropriate where you have a network of personal computers. A mini or mainframe computer will also require a centralized computer department for technical operations and support. Most large organizations will require a centralized organizational model.

5.2 Training Considerations

The personnel you have selected to support your computerization plans will all, without exception, require some form of training even if you recruit a computer expert. A new staff person may be expert about computers but will be a newcomer to your organization.

Assess Training Needs First

The first task in any training program is to assess needs. Focus on the operations which you intend to computerize and related software. Determine what personnel positions the new computer operation will require. (See Section 5.3 Personnel Considerations in this chapter for a detailed discussion of this.) Disregard for the moment the actual people who you think may fill these positions. Draft the job descriptions for these positions. Clearly state the responsibilities, skill, and knowledge requirements. Then consider actual people with which you intend to fill these positions.

Define Skill and Knowledge Requirements for Position

For each responsibility define the skills and abilities they will require. For example, a primary skill for many computer operators is often typing skill. Accounting applications may not require this skill. Entering numbers may be done through the numeric keypad. It is designed like many calculators. Problem solving and analytical ability are other skills that may be important. You may not feel qualified to determine skill requirements. Ask those who already use computers. Ask computer vendors. Disregard the actual people you may have in mind for the positions. Think about the responsibilities and skills you need first.

For each responsibility define the knowledge they will require. This is different from skills and abilities. In an inventory and warehouse application, the computer position may require knowledge about inventory and warehouse procedures and concepts. Accounting application computer positions may require knowledge about accounting concepts. Any computer position will require some knowledge about fundamental computer operations. Be specific about this knowledge. Perhaps you are sure that some knowledge will be required in a general area, but you do not know specifically what. Ask for specific advice from others until you have a clear idea of knowledge requirements.

Here is a convenient way to develop and represent this analysis. Draw three columns on a piece of paper. In the left-hand column, write in a specific responsibility. In the middle column, write in the knowldege required for that responsibility. In the right-hand column, write in the skill requirements for the responsibility. If in doubt, place the same item in both skill and knowledge columns. Leave room to add additional skill and knowledge areas. Then begin again with the next responsibility. Use chalk or white boards or large pieces of paper to develop your ideas. Refer to the following page for a sample illustration.

Add other responsibilities, knowledge, and skills. Use other paper if needed. Photocopy the following page as a model.

Skill and Knowledge Analysis
Sample Illustration

Accounting Clerk - Data Entry Operator

Responsibility	Knowledge Required	Skill Required
Daily entry of vouchers	*Chart of Accounts* *Income and expense voucher procedures*	*Typing and numeric keypad fluency* *Accounting software data entry* *Basic computer operations*
Validate data entry by comparing vouchers with computer reports	*Arithmetic* *Validation procedures* *Basic audit concepts* *Basic printer operations*	*Accounting software report printing* *Basic printer operations* *Manual dexterity*

Compare Individual Levels with Required Levels

Now you have defined most responsibilities, skills, and knowledge for each position. You are ready to assess the training needs of the individuals who will hold these positions. (See Section 5.3 Personnel Considerations in this chapter for a detailed discussion on staff selection.) Use a similar process. Describe the skill and knowledge levels that the individual has for each responsibility. Involve the individual and his/her supervisor in this process.

Compare the description of actual skill/understanding with the required skill/understanding. This will provide a clear assessment of that individual's training needs. Reassess the individual's status when training is completed. Has it met this person's training needs?

Management Training Considerations

Managers require special consideration for training. Where possible, provide this training before computers are actually installed. This will help managers develop an appropriate computerization strategy. Training should cover standard computer applications and systems point of view as discussed earlier under Chapter 2. Managers should not become the main computer user at the expense of their primary management responsibilities.

Standard Software Applications

Managers' training should provide a clear overview of standard applications software capabilities. Where possible, this should include actual hands-on use of the applications software. Managers cannot know what may be appropriate for their situation unless they are familiar with the capabilities of this software. Standard applications software include:

- Electronic spreadsheets - generally applicable for financial analysis, accounting, and small database management;

- Word processing - generally applicable where major reports are being written and where form letters may be sent to a mailing list;

- Database management - generally applicable where customized applications are being developed for finance, inventory, customer service, and data collection - often used in combination with spreadsheet and word processing applications;

- Telecommunications - generally applicable where electronic mail, computer conferencing, and access to international databases of information is needed (see Chapter 7 Telecommunications).

- Graphics - generally applicable where complex financial and statistical analysis must be presented as graphs and where desktop publishing is needed.

Other standard applications software packages may include statistical analysis, project management, and dedicated accounting programs. See the chapter on applications for a more detailed discussion.

Managers are not System Supervisors

In most organizations computers are used by operations staff more than by management. In small organizations a manager may be carried away by his/her enthusiasm for the technology. In this case the manager may begin assuming the duties of a system supervisor (see Section 5.3 Personnel Considerations in this chapter). Generally, this is not appropriate.

Managers should focus their attention on broad data-processing requirements in their organization. They should learn enough about the technology to thoroughly understand it. In some circumstances they may need to know how to perform all the technical computer operations. They definitely need to be able to judge whether these tasks are being carried out properly. Managers generally should delegate daily operations to qualified operations staff.

The following is a suggested list of management duties with regard to computer data processing. It may be helpful in defining management skill and knowledge requirements. This guide is designed to help the manager meet these and related responsibilities.

- Recruitment, hiring, training, and supervision of computer personnel;
- Monitoring and supervising the use of computer systems;
- Planning and budgeting for computer operations;
- Negotiating contracts with computer dealers.

Keyboard Skills

Many managers have not had the opportunity to learn keyboard skills. Often administrative staff learn more quickly on the computer simply because they already have typing skills which they can apply directly to keyboard operations.

Invest in software which will allow managers to teach themselves touch-typing keyboard skills. Provide private time for them to learn these skills.

Staff Training Considerations

There may be different types of computer users in your organization. Some may require more technical training than others. Computer-related training should become a permanent process in your organization. Most of this training can be on-the-job.

Types of Computer Users

The most important type of computer user is the system supervisor. This individual will have the most advanced knowledge and skills with regard to the technical operations of the computer system. They may not need advanced skills in the organization's primary applications software. This is discussed in greater detail in Section 5.3 Personnel Considerations in this chapter.

Another type of computer user is an applications operator. This user specializes in one particular applications software, such as an accounting package. However, this user may know little about other computer operations. This user can turn on the computer, run his/her specialized applications software, and turn off the computer. This user depends on the system supervisor to answer technical questions. The system supervisor may need to monitor the applications operator's activities to ensure that the data and computer software is safe for all other users. An example is an accounting clerk who may devote his/her full attention to entering accounting information into the accounting program. Another example may be a secretary who uses only word processing software.

The applications operator needs narrowly focused training on how to use their particular application.

A third type of user may rarely, if ever, actually use the computer. It is the information consumer. These individuals depend on the data-processing capability of the organization to provide them with information they need to make decisions. These people often include managers, as discussed above. Many other staff may benefit from a general understanding of computer capabilities and applications. They can help identify new, useful ways to use the computer, even when they, themselves, may not use it directly.

Identify who will be using the computer. Will they need narrowly focused training? Will they need advanced technical training? Will they need a general understanding of computer data processing?

Develop a training program and clearly identify individuals who will be receiving training. State clearly in advance their responsibilities with regard to computer operations. Explain who will be using the computer and why.

Training is a Continuous Process

Information technology is one of the fastest growing and changing fields in business. Data-processing applications introduce powerful tools. Users can quickly learn to use these tools in fundamental effective ways. However, advanced skills will take time and opportunity to acquire.

Adopt an initial short-term goal of providing minimum required training to users such that they can immediately begin using computers in their work. Then apply a long-term goal to challenge each user to learn new skills as they use the technology. Like any other tool, the more you use it, the better it will serve you.

Users often cheat themselves and their organizations out of improved creativity and productivity. They use only basic skills and remain unaware of exciting and powerful features that are literally at their fingertips.

Encourage users to try new ways to do old tasks. It may take longer the first time, but the lessons learned will make valuable contributions in unexpected ways.

A continuous training program will reassure employees. They will feel confident in their positions and in their employment. They will feel that the organization is supporting them to learn how to use the technology, instead of replacing them with it.

In-house Training

Within any organization many skills are found which can be shared. This is the most cost-effective training resource available. Provide time for users to meet and share problems, solutions, and questions about computer operations and applications. Reward them for sharing their skills with others. Place in-house training high on the list of responsibilities for your system supervisor.

Invest in computer training software. This is sometimes called instructional software, tutorial software, or computer-aided instruction. Most commercial applications software include some form of training program. These programs use the computer as an instructor. The user can learn by reading and doing the exercises as presented by the computer software. Sophisticated training software can be an excellent cost-effective resource.

Consider investing in video and audio tape training materials and supplementary manuals for applications software. Provide time, encouragement, and motivation for staff to use these resources in-house.

Guidelines for Using Outside Training Resources

Training is an important investment when computerizing for the first time. Budget for generous and effective training. Inadequate training may lead to lost office productivity, expensive mistakes, and increased training costs later.

Formal training should include some form of testing before and after training. Without testing there is no way of knowing if the training experience was effective. Compare training results with the training needs assessment as described above. Base your training on the software you have selected to meet your needs.

On-site vs. Off-site Training

Whether individualized or group, on-site training can be more effective than off-site. You can keep costs down by paying travel expenses for one or two trainers to come to your site, instead of paying for more than two of your staff to travel off-site. Participants may learn by using the same equipment in the same environment where they normally work. Trainers can more easily use illustrations and training exercises drawn from the participants' work environment.

One of the most effective training strategies begins with on-site group training covering fundamental computer operations. Thereafter, the trainer comes to the organization periodically for individualized instruction. Participants begin using practical applications immediately, under instructional supervision.

Between formal on-site training sessions, participants can use instructional software, books, audio tapes, and video tape resources.

When appropriate, the system supervisor may assume on-site training responsibilities.

Group Training

Group training may be in a formal seminar-type environment. It may be a standard course offered to the general public. Review the course outline in detail first. Is it appropriate? Consider who generally attends this course. This will suggest how appropriate it may be.

The best training includes opportunity to actually use the skills. "Hands-on" training should include at least one computer for every three participants.

Individualized Formal Training

One of the advantages of formal training is that it often takes place away from the office. It may avoid the distractions of the office. This may be a prime consideration for managers.

Any such formal training should include "hands-on" experience as well as theory. Equipment should always be similar to that which the users will be using in their own organizations.

Formal training is best when "individualized." Participants receive a blend of formal training materials. These materials may include texts, audio/visual presentations, and/or lectures. Participants are allowed to work without distraction at their own pace. They use practical exercises that relate directly to their topic of study.

Individualized formal training is often expensive.

Overseas Training Considerations

Under some circumstances local training resources may be inadequate or unavailable. Here are some options and considerations for drawing on overseas resources:

- Consider overseas training as a last resort. It is expensive. There is often little assurance that it will be effective and relevant.

- It may be more cost effective to bring qualified training resources from overseas to your site. Travel expenses for one trainer may be less than for a group of your staff. Staff may continue to perform many of their functions during the training period. Training can be performed essentially on-site with all the advantages described above.

- Training courses designed and delivered overseas may not focus on your own organization's requirements. This may be an important consideration when deciding to bring a trainer in or to send trainees out.

Use Local Resources

Computer users enjoying sharing what they know with others. Local groups can be an excellent source of support. Computer magazines and newsletters can sustain enthusiasm and help keep your computer staff informed of advancing technology. Using these resources help sustain and achieve long-term training goals.

User Groups and Computer Societies

People who use computer technology are often enthusiastic and willing to share their enthusiasm. The Boston Computer Society has over 30,000 members and affiliated groups all over the world. In many cities groups of computer users meet to share their knowledge as well as their problems. Computer professionals often donate time, materials, equipment, and information to these groups in return for the legitimate exposure they get. These groups may be formal or informal.

Ask other computer users if such groups exist locally. Ask computer dealers, programmers, and analysts. Encourage your staff to attend meetings and to contribute time and resources to such groups.

Many user groups and computer societies sponsor inexpensive introductory training. Software and hardware vendors subsidize or provide free training through these groups to promote their products. Members of these groups can recommend other professional and appropriate training resources in your area.

If no user groups seem to exist, consider sponsoring the organization of one. Start with a user's group within your own organization. Invite other organizations to send staff. Open it up to the public. Provide meeting space on your premises. Provide supervised access to your equipment. Invite local hardware and software vendors to participate in (but not dominate) the group.

Magazines and Newsletters

Subscribe to as many local newsletters and magazines that seem worthwhile. These are often published by local user groups and computer hardware or software vendors. They will contain the most appropriate information for your local area. By subscribing to them you also provide your support to your local industry.

Consider carefully internationally available magazines, newsletters, and journals. Some may focus on your region (such as Africa, Latin America, Southeast Asia). They will inform you of important conferences and events to which you may want to send representatives. Vendors who advertise in these publications may be more familiar with environmental characteristics of your region, power, heat, dust, humidity. Vendors may be able to handle shipping, import, and export procedures better than those who advertise primarily for a United States or European market.

Finally, consider at least one or two of the industr's leading journals. Even though they may seem too technical, your staff may enjoy the opportunity to monitor new developments in the industry.

Reference Materials

Computer hardware and software usually have their own manuals. You may find many useful "how to" books in your local stores. Encourage your staff to use these materials. Review their glossaries and indexes. These should be your first resource for answering any computer question or resolving any computer problem.

Allocate Training Time

Everyone learns different material at a different speed. The best computer training is self-training by doing. Budget for providing your computer staff with generous amounts of work time to learn new techniques at their own pace. Reward them for using this time wisely.

It may be reasonable to allocate fully 50 percent of work time to self-training during initial computer installation over a period of several months. Consider taking on temporary staff to assume duties and release staff for computer training.

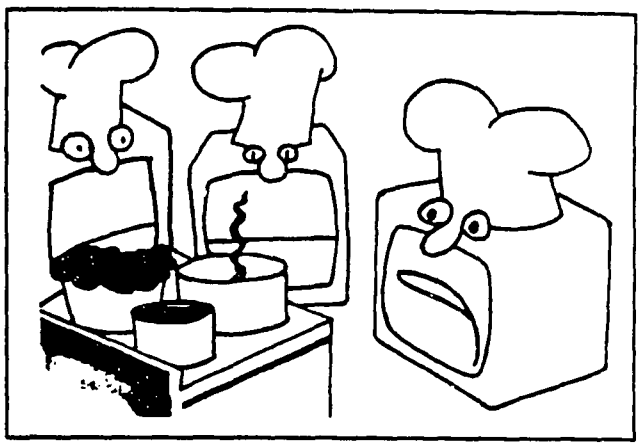
There is no limit to the value and scope of self-training opportunity. The more your staff learns the more they will be able to apply the technology to their work tasks and those of their colleagues.

5.3 Personnel Considerations

It is easy to underestimate the impact computers may have on your organization. When introducing a computerized application, you will face the opportunity, even necessity, to carefully and even drastically change how you operate. You may need to change your manual procedures to take full advantage of your computer application. It may be important to assign clear supervisory authority over their use.

This may be traumatic to your organization and may add to the installation and conversion process. Some staff may be afraid that they will lose their jobs to computers, or to outsiders who have computer skills that they lack. One approach is to plan on introducing an application that closely matches existing manual operations, even when far more efficient procedures could be included. Budget and plan for re-developing the system one or two years later when staff are accustomed to a computerized operation and can fully participate in designing the new system.

System Supervisor Positions



Too Many Computer Cooks?

Before installing a computer system, consider the need for a "system supervisor" position. As noted earlier, a system supervisor would have advanced skills in operating the computer, including any of the applications software. This person may even have programming skills and the capability to develop sophisticated applications for your organization. This person would be responsible for supporting, coordinating, and supervising all computer activity in your organization. Without a system supervisor, you may have "too many cooks in the kitchen." You may also need an assistant supervisor to fill in during the system supervisor's absences.

A system supervisor position may not be needed, it may be simply a part-time responsibility of an existing position, or it may be a full-time position. The fundamental criteria for determining this need include:

- the size and complexity of your computer system;
- the nature of the data processing to which your computer will be dedicated.

A Large Complex Computer System Requires a System Supervisor

Large organizations generally require several stand-alone personal computers, a network of personal computers, or even more complex mini and mainframe systems.

In some cases one or two stand-alone personal computers may be used by several different departments for important data-processing applications. In this manner, the single personal computer is really a complex system for multiple users.

These systems will require skilled supervised support to protect data, maintain and coordinate operations procedures, and provide continuous in-house training.

Where there are only one or two microcomputers in operation, a system supervisor may be a part-time responsibility of some other existing position. An example is a senior accounting clerk

position. Consider carefully that this person may need to support computer users from other departments. Often it is easy to provide priority treatment to his/her own department and neglect others.

Larger systems may require a full-time, dedicated position which may even report directly to the senior manager of the organization. An independent computer department staffed with programmers and analysts is common where a network or larger system is operating. An independent position or one attached to a general services or administrative department may provide more equal support to all departments.

Critical Data Processing Applications Require a System Supervisor

A single, relatively small microcomputer may provide critical data-processing services to an organization. Such services are critical to the operation, success, and even survival of an organization. Accounting is a common example. Under these circumstances a system supervisor position is also critical.

Again, such a position may be part of the responsibilities of an existing position. However, the individual should have advanced skills in computer operations. Data security, including full back up and restore procedures, are essential skill areas. All computer users should clearly understand that any computer operations are under this individual's authority, supervision, and responsibility.

Where applications are not critical, such as word processing, data security is not a critical concern.

Ask yourself this question: "If the computer were to fail now, how serious a problem would it cause?" If the problem is serious, then you need a system supervisor to whom responsibility and authority are assigned. If the problem is not serious, ask yourself if your organization is using the computer sufficiently to justify its expense.

An Assistant or Back-up System Supervisor is Important

Your system supervisor may have essential skills and perform an essential function for your organization. What will happen when this individual goes on vacation, is out sick, or resigns? Is there someone else immediately available to fill this position? Will someone know all the critical data security and computer operations procedures?

Good managers delegate all essential work to others such that when they are absent the organization continues to function. In much the same way, a good manager makes sure that no

single person is absolutely essential to the organization. Appoint an assistant system supervisor where you need a system supervisor. Make sure that this person's skills are adequate for essential operations.

Ask yourself periodically, "If my system supervisor disappears today, how big a problem will I have?" Will you be able to find back ups of critical data? Will your users be able to perform their tasks? If the computer requires repairs, will someone know how to arrange for repairs?

Promote and Train Existing Personnel First

When introducing computers initially into an organization, existing staff may fear that they will lose their jobs. They may fear that they will not be able to learn the new skills required for their jobs. They may fear and resist the change that computer operations will bring to their jobs.

Clearly explain that their jobs may change dramatically. Some jobs may completely be eliminated. Try to promote an organizational commitment to never dismiss an employee only because his position was eliminated as a result of computerization.

If possible, adopt a policy of promoting and training existing personnel first. Hire new personnel from outside only as a last resort and without dismissing any existing personnel.

Relatively small computer systems will require relatively modest skills. These skills can be provided to existing staff who already understand and are committed to your organization. It may be more cost effective to invest in this training than to create a new position or to hire an outsider who has computer skills. Usually it is easier to learn computer skills than it is to learn the business of your organization.

Complex computer systems may require full-time system supervisor positions. This may force you to hire an outsider who already has the necessary advanced technical skills. Try to develop a strategy of filling other new computer positions with existing personnel. Fill their old positions with temporary staff. When the new computer system is fully operational, it may allow you to dismiss the temporary staff.

Basic Qualifications

System supervisors should have certain basic qualifications. These are in addition to those specific skills for any particular computer system. Existing non-computer personnel may have these same basic qualifications. These qualifications have little to do with computers, but they suggest that these individuals will be able to quickly acquire new computer skills. They include:

- Firm understanding of administrative and accounting systems in general and those already existing within your organization in particular;
- Analytical ability (the ability to identify a problem area or an objective and to specify the steps needed to be taken to solve the problem or achieve the objective);
- Solid understanding of database management systems, spreadsheet analysis and word processing;
- Some background in any programming language (including BASIC);
- Experience in a supervisory position;
- Willingness and aptitude to learn (technology is changing and requires a continuous learning process);
- Good command of the English language (since many computer related materials are in English);
- Experience and orientation as a problem-solver;
- Ability and willingness to read technical manuals.

What other qualifications will you need? Write in the space below. Use pencil.

How will computers affect you and the people in your organization? Who will need training? Write in the space below. Use pencil.

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Chapter 6: System Management

At this point you may have defined your application needs, selected the appropriate software and hardware, and fully considered the personnel and training requirements. Place these considerations in the context of a strategic plan for implementation. Be prepared to assign clear responsibility for administering the plan and subsequent data-processing operations. What measures will you take to safeguard your data and your hardware? Prepare a physical location for your computer equipment. Avoid simply putting it on the corner of any available desk.

6.1 Developing a Strategic Plan

The first step in managing any computer system is to assess your needs and develop a strategic plan. This plan is important even if you already have computers. It is a critical first step towards acquiring computers. Develop your strategic computer plan to support your overall organizational plan. Think in terms of the next five years.

Anticipate Future Needs

Your data-processing strategic plan should support your overall business plan for the future. If your business plan anticipates growth, what will this impact be on your data processing needs?

Plan carefully to invest in the training, equipment, and software development so that it will be in place and ready to use when you most need it.

If you are introducing computer technology for the first time into your organization, consider a two-phase approach. During this first introductory phase, focus on low-risk applications. Introduce word processing and spreadsheet applications. These may be used without risk to your operations. They will help your staff become comfortable with the technology. In phase two, perhaps one year or more later, plan on computerizing critical operations. These might include accounting, inventory, and membership.

Budget for Hardware Replacement/Upgrade

Computer hardware has an indefinite life span. If maintained and used carefully, it may last for many years. It may last beyond its true usefulness. Plan on converting computer equipment to appropriate low-risk applications when adding new equipment.

Slower machines may work fine for word processing, while newer faster machines may be assigned to critical processing using newer software. Newer software may take full advantage of the newer computer capabilities.

Avoid enhancing old equipment. Enhancements are often not cost effective. Plan to replace old computer equipment entirely. Either sell it or, better yet, a[illegible] it to appropriate low-risk applications.

Consider Software Replacement/Modification

Software publishers are always upgrading their products to take advantage of new hardware capabilities. Budget to upgrade commercial packaged software with newer versions when you upgrade or replace your computers. Software upgrades are often inexpensive relative to buying the package new. The upgrade may cost only 10 percent of the full price.

Customized software may also require modification or replacement. Well-designed customized software may create and maintain database structures that will provide valuable analytical information in the future. Plan on designing and developing reports that use this information.

Provide Personnel Training and Development

Continuous training for computer personnel is an important component of your strategic plan and part of daily system management. Look for opportunities to challenge users to learn new techniques. Provide generous amounts of time for learning on-the-job.

Plan for your computer staff to leave at any time. Be prepared to promote other staff into computer user and even system supervisor positions.

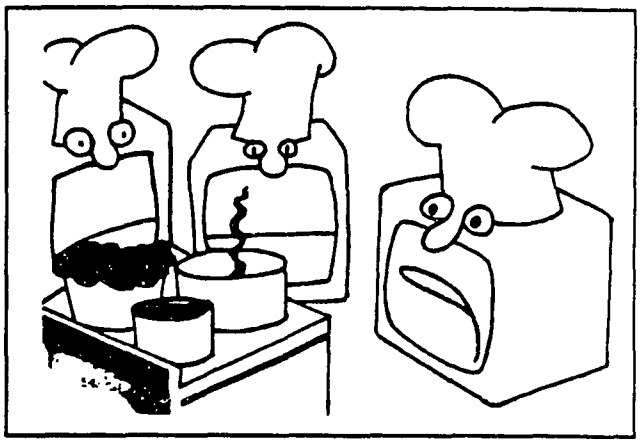
Monitor the activity at each computer and terminal. Provide appropriate access to as wide a number of staff as possible. Provide enough terminals or PCs so one is always available. If all computers and terminals are used all the time, you may need more.

6.2 Administering a Data-Processing Operation

Assign Clear Responsibilities and Authority

This is the most important factor in administering your data-processing operation. Sometimes an organization will install a computer without clearly placing its use and care under one person's responsibility. Under these circumstances a variety of people may begin using a variety of applications, some of which may conflict with each other. Demand for computer use may increase to the point where conflicts arise. Data may be at risk because no one is held responsible for managing and protecting it. Some applications may repeat work done in other applications. Computer supplies run out, and no one feels responsible for replacing them.

Where a small organization has only one or two computers dedicated to low-risk tasks such as word processing, it may be sufficient to assign responsibility to those who use them the most. Each computer may have one person who supervises its use. Provide them with the necessary training to use and supervise the use of their computers.



Too Many Cooks and No Chef

However, a larger organization having many stand-alone computers may require an overall system supervisor or computer coordinator or similar position. Even if the computers are dedicated to low-risk applications, it is more cost efficient to train one person to support and troubleshoot them all. It may even be a full time position created exactly for this purpose.

A stand-alone microcomputer may be used for critical data-processing tasks. In this case, it is no longer a "personal" computer but attains the status of a multi-user, multi-tasking computer. Its operation warrants the supervision and support that a network, mini, or mainframe environment would. The position may not require full-time attention. Some single person should be held responsible for managing and supervision critical data processing procedures on this computer.

Clearly, any multi-user environment requires a system supervisor or similar position. The size and complexity of the network will determine whether the position is full-time or part-time.

Large organizations may need a system supervisor for each department. This may be true if the organizational design places a relatively independent computer system in each department. If these systems are linked in a network, you may need some centralized control through a system supervisor, who may be head of an independent computer department.

When assigning system supervisor responsibilities, provide clear evidence of their authority. Even if it is a part-time position attached to an existing position, grant the new title. A single employee might be both system supervisor and office administrator, for example. Don't bury the responsibilities and the title in an existing position. Grant authority to the system supervisor for scheduling use of the computer facilities. Grant him/her authority to restrict access to these facilities.

Visit other offices. Talk to other managers. Learn what successes and problems they have had administering their operation.

Insist on Regular Written Reports

Where there is a system supervisor, insist on regular written reports on the status of computer operations. These reports may be brief. The system supervisor may simply check off that he/she has reviewed the computer logbooks, noting for your attention any problems being addressed. Dates of the most recent data back ups are especially important. The report might also indicate the level of computer supplies on hand.

This may seem so brief and obvious as to be unnecessary. However, without regular written reports conditions may deteriorate without your knowledge.

6.3 System Safety and Security

Safety of your data and software is protection from loss due to theft, fire, hardware failure, viruses and operator error. Security is protection from unauthorized access.

Back Up, Back Up, Back Up!

These are the first and most important three rules of system safety. Computer media is volatile. All the data and software on your hard disk and diskettes may be lost at any time. You cannot know when. **You can be sure** that eventually your hard disk will crash and all will be lost.

Back-ups can be made to diskettes, back-up tapes and to other computers. Most computer users use diskettes.

Software

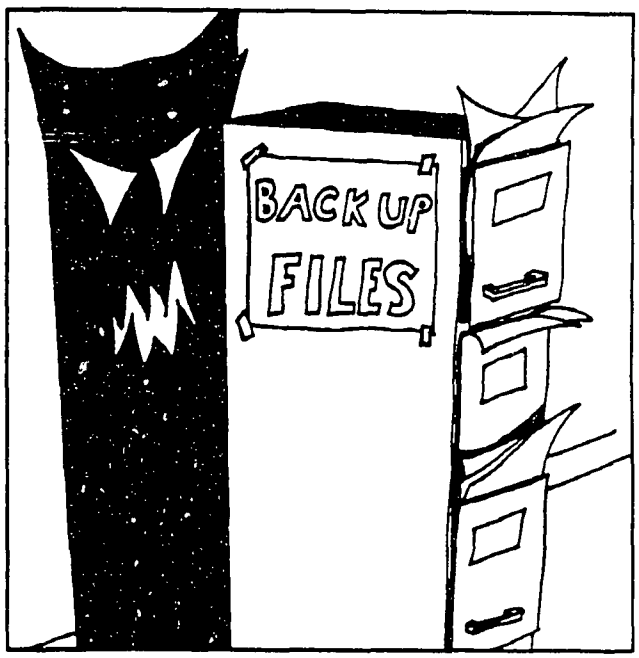
Commercial software generally comes to you on diskettes. After installing the software on your hard disk, keep the original diskettes in a safe place. This is important. Some software companies use copyright protection features. These features will not allow you to use any other means for transferring your software from one machine to another. It may be difficult and expensive to replace original commercial software diskettes. Usually, you will need no additional back-ups of software. If your hard disk crashes, you should be able to re-install the software with little difficulty using these original diskettes.

Commercial software may represent a large investment. Store these original diskettes in a cool, dry place away from your computer room. A bank safe deposit box will usually be ideal. If your computers are stolen, you will at least have your original software diskettes.

Data

Back up your data regularly to diskettes. This is the most important data-security procedure you can perform.

Imagine how much time and personnel cost will be required to re-enter all the data that you have accumulated on your hard disk. In an accounting system, for example, you may have thousands of transactions entered over a one-year period. In some organizations the data stored on their computer is worth several times more than the cost of their computers themselves. For some organizations their only back-up is the filing cabinet of original documents.



Back-up Files?

Back up data for even low-risk operations such as word processing. When writing a long report, imagine that your computer breaks down. How much work are you willing to do over again? 15 minutes' worth? 30 minutes' worth? One hour? Your answer to this question will tell you how often you should back up your report file to a diskette.

You need data back-ups in case your hard disk fails and all your data is lost. You also need it in case you enter wrong data into critical data-processing operations or if you delete files accidentally. Usually data is not lost due to hard disk failure. It may be contaminated by viruses, by other programs, or by power interruptions. Users are often the cause of lost data and software.

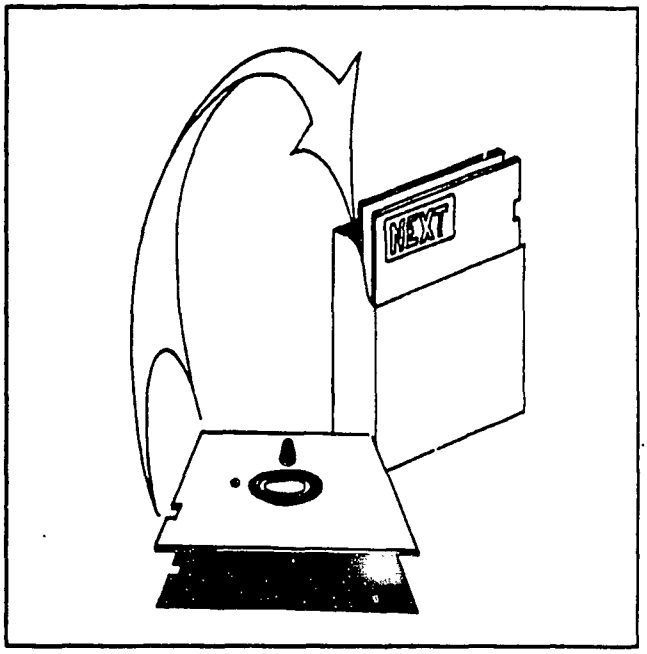
The Three-Generation Back-up Procedure

This is the fundamental procedure under which all back-ups should take place. It provides for three levels of protection in case your hard disk fails.

To initiate a three-generation back-up, make three back-up copies of the same data at the same time. Label them as sets A, B, and C. It does not matter which set receives which label. Note clearly the date and time when the back-up was made. Place set A behind the other two sets.

Use set B as the set to which you make a back-up the next time. All the previous data on back-up set B is automatically erased and replaced by the new set. Note the date and time this new back-up was made. Now you actually have two generations of data. The most recent generation is that which you just backed up. The oldest is on sets A and C. Place set B behind the other two sets. Set C should now be in front.

When you make a third back-up, use set C. All the previous data on back up set C is now replaced with the most recent data. Place set C behind the other two sets. This now provides you with the third generation of data. Set A has the oldest generation of data (the first when you made the first three sets), and set C has the most recent. Set A should now be in front, ready to be used as the next back-up set.



Three Generation Back-up

Each time you make a back-up from this point on, use the set of diskettes containing the oldest data. Place the newest back-up set behind the others. The oldest set will be in front, ready to be used for the next back-up.

The three-generation back-up procedure is important. If your hard disk crashes or your data is contaminated, you will want a back-up of the most recent version of your data. This will force you to repeat the smallest amount of work. However, there is a possibility that this recent back-up may also contain contaminated data. Sometimes data contamination may not become evident right away. You may have backed up contaminated data without knowing it. The diskettes may also have been damaged.

Now you can try the next oldest generation of data. If that also is bad, you can try the next oldest generation. If even that one is bad, then you need to resort to other back-ups as described under the next section.

Data Back-up Frequency

The frequency for data back-up depends on the nature of the data and the amount of activity. A general rule of thumb is to make back-ups every time you have done enough work such that you do not want to repeat it. In reality hard disks are reliable, and when your staff becomes familiar with data-processing procedures, you will begin gambling a little with your data.

As a minimum guideline, back up your data on a daily basis. Of course, this is not necessary unless something about your data has changed during this day, either you have added something or you have modified something. Keep daily back-ups near the computer where it is convenient. Follow the three-generation procedure.

As extra protection, you may want to begin a weekly and even a monthly back-up routine. These back-ups would also include three generations. Some organizations expand these monthly back-ups to twelve generations, such that they have a back-up for each month. This may be appropriate for accounting applications. These are in addition to your daily back-up sets. Keep these diskettes stored off-site away from your computer system along with your original software diskettes. If your computer room is lost to fire, flood, theft, or vandalism, your valuable data is still safe.

You may also want to make annual back-ups. Again, this is common for accounting applications. Annual back-ups may be retained permanently, in which case you can consider them as ancestral back-ups. You will always use a new set of diskettes to make them instead of erasing old data from an old set.

Individuals may also make "personal" back-ups of any documents and data files for which they are personally responsible. They may assume responsibility for backing up only these files instead of waiting for the entire hard disk to be backed up.

Off-Site Back-ups

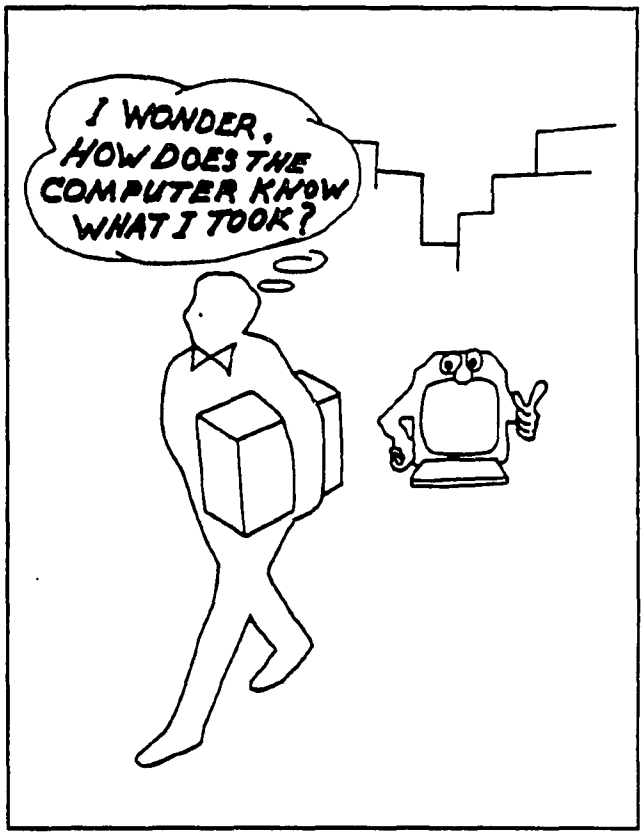
Always store a back-up set somewhere away from the building in which your computer is stored. In case of fire, theft, or similar damage, you can easily replace the computer equipment. You cannot so easily replace the data unless you have a back-up available.

Supervise Data Entry and Use

Protect your data from loss, contamination, and theft by supervising all access to your computer system. Supervise data-entry operators to ensure that they enter data correctly. Assign appropriate responsibility and authority.

People may be accustomed to walking away casually with items from a warehouse. A computerized system will require strict new procedures. Accurate inventory information will come out of the computer only if accurate data goes into it.

Restrict access to computer facilities.



Computers and People must work together.

Computer Viruses

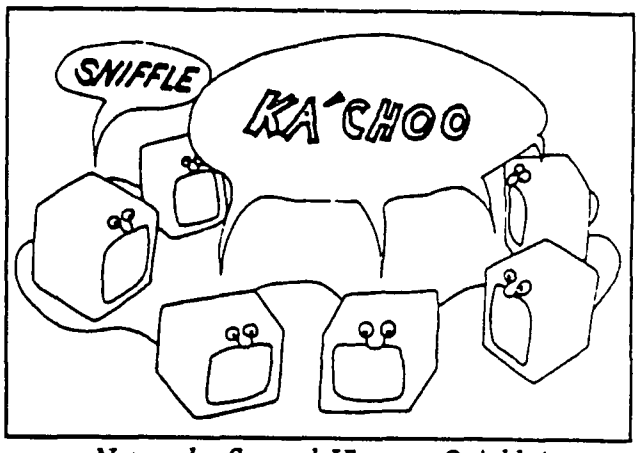
Computer viruses are real hazards. They behave similarly to actual disease viruses. Some of them cause little or no harm. Most of them seriously attack your hard disk, sometimes in ways which you will not realize until it is too late.

Viruses are especially dangerous to any network operation. One user may introduce a virus through his own computer terminal, and it may quickly spread to all the others.

The best protection against computer viruses is to absolutely prohibit introduction of any pirated software or unknown disks into the system. Also, strictly control access to floppy disk drives. Viruses spread most easily when diskettes are shared. They are programs which attach themselves in a hidden manner to other programs. When these other programs are run, the viruses take over.

Viruses also spread when software is shared through a network or telecommunications link. Most telecommunications activity does not present a virus risk. The risk is present only when you exchange computer program files via modem. Most telecommunications activity involves exchanging only text and data files.

There are excellent computer programs available which help protect against viruses. They may monitor the programs on your hard disk to be sure they do not change in size (indicating a viral attachment). When they find a virus, they often can eliminate it. This may save you a great deal of trouble and expense.



Networks Spread Viruses Quickly!

Logbooks

Consider initiating the use of logbooks to monitor data-processing activity. A logbook is a bound book containing non-removable pages. It provides a chronological record of events. Each entry should contain a date, time, description of the event, and the initials of the person making the entry.

Logbooks are useful when different people are in charge or use a facility at different times. It provides a medium of communication between these individuals by which they can together address procedures, problems, and opportunities.

Operations Logbooks

An operations logbook may record general use of data-processing facilities. Some organizations already use similar logbooks to monitor vehicle use and maintenance. Entries into an operations logbook might include:

- Date and time computer facilities were opened for the day and initials of person responsible;
- Unusual observations and problems at the time of opening (such as low power light on a UPS or supplies cabinet left unlocked);
- Date and time of blackout and notes on the operation of the UPS including battery use time and recharge time;
- Date, time, and names of individuals using the facilities during the day;
- Date, time, and nature of hardware problems, operating system error messages, and printer failures.

Applications Logbooks

You may want to use logbooks to monitor activities for certain critical applications such as accounting and inventory. This logbook aids in supervising data entry, use of critical applications, and identifying general user problems. It may be an important tool for data-recovery procedures. The logbook could help determine what data was lost since the last back-up was done. Your operators will need to re-enter this data to bring the application up to date.

Typical entries in an applications logbook might include:

- Date and time the application was used and by whom;
- Date and time specific sets of data were entered (such as all accounting transactions from check number to check number) and by whom;
- Date and time the applications data was backed up;
- Date and time any critical data processing or reporting was completed and by whom;
- Date and time of any problems encountered.

Hard Copy Archives Guidelines

Most critical applications receive their data from hard copy (paper) source documents. These will be important documents for auditing the application's processing. As your operators enter the data from these documents into the computer, stamp each document to so indicate. Keep them in the same order by which they were entered or in a specified order for the application. This will permit you to easily validate data entry.

Critical applications should provide special processing reports that list data entries in such a way as to permit you to verify accuracy against the source documents. File these reports carefully. They may be important tools in any data recovery or future audit procedure.

Critical applications all provide a variety of reports which represent their primary purpose. These reports are the application's outputs. You may want to file these reports carefully in the computer room. They may be important tools in future data recovery, audit, systems development, and modification.

Paper is also the ultimate back-up. If for some reason all your magnetic data was lost, it is highly likely that your paper may survive. You may rest easier if you periodically print all your data to paper. As a last resort, you can re-enter it manually.

6.4 Hardware Security

Preventive Maintenance

Perform preventive maintenance as described under the hardware chapter. This will reduce your risk of equipment failure and corresponding data loss. Especially perform periodic diagnostic tests on any hard disk.

Computer Repair Services

Your best option is to secure on-call repair services. If you are running critical applications or have a network environment, arrange for fast repair or replacement of critical components.

If necessary, purchase a service contract from a reputable repair source. This should guarantee you fast repairs. Service contracts may be more expensive over the longterm than an on-call arrangement. In some locations these arrangements may be difficult to secure, but make the effort. Don't wait until you need the services.

Be sure to budget for service expenses. See the chapter on hardware.

Physical Security

Theft of your computers may represent a greater loss than simply the value of the equipment. Your data may be more valuable, even priceless. Take reasonable precautions against theft. Maintain appropriate controlled access for authorized personnel.

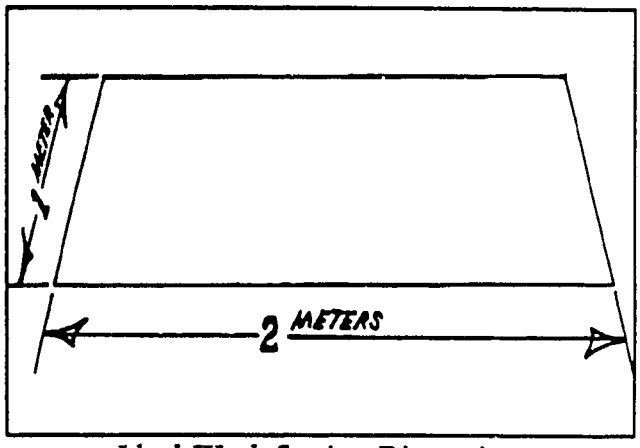
Consider attaching your computers semi-permanently to tables and walls using cables, such as used for bicycles. This won't deter a serious thief but may minimize risk.

6.5 Site Preparations and Considerations

Appropriate site preparations and furnishings will improve productivity.

Furnishing Requirements

Inadequate work space around a computer station is a common problem. Consider a work space of one meter by two meters (approximately three feet by six feet) as a minimum for each stand-alone microcomputer work station. Data entry work will be much more efficient if users have space to keep their source documents organized. Some users place source documents to the left and some to the right. Provide plenty of space for each option.



Ideal Work Station Dimensions

Computer operators need comfortable chairs. Comfortable chairs will improve productivity.

Provide filing cabinets to store source documents, processing reports, and applications reports. Don't forget cabinets for computer supplies such as diskettes, paper, and printer ribbons. A bookshelf will provide space for the many software and hardware manuals which come with your computer.

You may require a desk in addition to computer work stations. This depends on the organizational design and personnel strategy you implement.

You may require a telephone to support telecommunications. Usually, this does not have to be a dedicated line. It can be an existing line provided that no one picks up an extension while it is being used for telecommunications.

Electrical Supplies

The electrical supply for any computer should be as clean and stable as possible. In many cases you may find it worthwhile to have an electrician install a separate grounded circuit to serve all computers. This will help insulate them from power fluctuations that heavy electricity users cause. Air conditioners and photocopiers are a primary source of power fluctuation. Refrigerators and electric heaters are also heavy users that can cause electrical problems.

Seek the advice of a qualified electrical technician who understands computer systems. Determine the correct set of power conditioning and protection devices for your computer

system. These may include a transformer, automatic voltage regulator, and uninterruptible power supply.

Computer systems often require many outlets for their many devices. Power bars are available that contain some protection against surges in voltage. They typically include four to six outlets. The power bar converts a single outlet to multiple outlets. Avoid "octopus" connections that become unstable and a fire hazard.

Computer Supplies Inventories

Maintain a generous supply of computer paper, printer ribbons, and diskettes. Assign clear responsibility to someone for reordering these supplies when needed.

In remote locations where supplies may be difficult to obtain, consider keeping enough for one year on hand. Reorder when your supplies are down to six months worth, sooner if you expect more time may be needed to obtain them.

Room Dimensions for Centralized Operations

Centralized operations imply a network environment with one primary file server. In this case the room should be no less than 16 square meters (144 square feet). This provides minimum space for the equipment and some supplies.

A centralized operation may also include a few microcomputers placed in a centralized location. All users come to that location to use the computers. Allow at least eight square meters (72 square feet) for each work station. For example, a computer room to accommodate four work stations could be approximately 5.6 meters by 5.6 meters (17 feet by 17 feet).

In a networked environment you will be running cables throughout your facilities.

Decentralized Operations Considerations

Decentralized operations suggest that computer and/or terminals will be placed in a number of places throughout your organization. Follow the guidelines above for providing adequate work space. Generally, desks are too small for effective computer work stations. However, they can serve if necessary.

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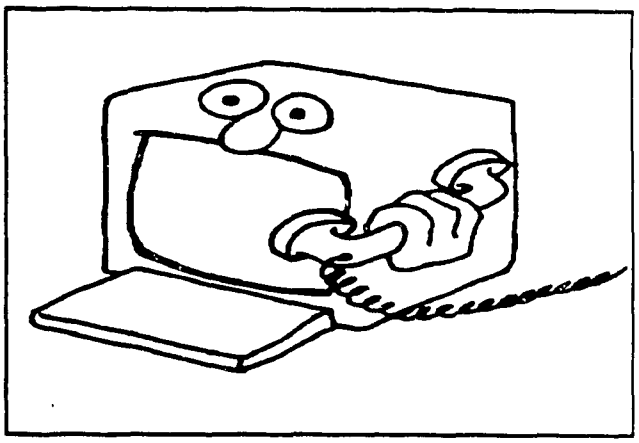
Chapter 7: Telecommunications

Telecommunications may be an important application for your computer system. Electronic mail can now easily put you in touch with colleagues around the world. You may choose to link your computer directly with another computer via telephone to transfer information. A modem and communications software will provide you with this capability. Sending a diskette through the mail may be an inexpensive means for transferring electronic data. You may even connect your computer to a radio, or use it as a FAX machine. Check with your local telephone authorities for regulations and available services. Ask other organizations what their experience has been. Ask for a demonstration. What media do they use? Why do they use it?

7.1 Basics of Modern Communications Technology

Digital Information

The telegraph was the earliest form of telecommunications technology. It was based on a simple switch turning an electrical current on and off. In so doing a similar switch somewhere else on the line also turned on and off. Morse code was designed to use this technology for communicating with simple on/off signals. The spaces between the on's were either short or long and combined together became the code. Short short short, long long long, short short short means "SOS" in Morse code.



Computers Communicate

The telephone used similar technology to encode the voice by modulating the electricity in the telephone line. Instead of only off and on, we used variations in the electrical characteristics. This is called analogue communications because the electricity is modified, modulated, according to the characteristics of the voice.

Computers introduced a powerful new means of transmitting our voices over telephone lines. Instead of modulating the electrical current, computers now convert the sound of our speech into digital information. When we receive it, it is reconverted into sound we can hear. As packets of information, our voices can now travel a variety of routes to their destinations. Many voices can use the same lines. Computers put an electronic address on each packet so that it reaches its correct destination and is not confused with other packets.

Digital technology has ushered in many new options for communications.

Multiple Media Options

These improvements in voice telephone systems on the surface seem to be a wonderful advantage; however, this has lead to sky-rocketing telephone costs. Their ease and convenience is seductive compared with alternatives. Still, playing telephone tag with someone on the other side of the planet is no less annoying and far more expensive than playing the same game with someone literally down the hall. Time zone differences may provide a small window of time each day to use voice telephones.

FAX machines may represent the single most significant new medium to be introduced since the telephone, to which it is closely related and whose infrastructure it shares. FAX machines convert images to digital data and send the data to a receiving FAX machine which reconverts it to an image. FAX can send more words per minute than you can speak. And if a picture is worth a thousand words, you can add this feature to its advantages. As long as the receiving machine is turned on and available, communication is possible regardless of time zone differences or the availability of the individual to whom the message is addressed. These are significant advantages.

The proliferation of microcomputers now offers new alternative media for communications ... and also new demands. Computer based systems now have been installed all around the world. Microcomputers have been effectively applied under virtually all conditions, from stark desert to humid tropics, from densely urban to remotely rural areas. They can now run reliably on solar powered systems, generators, or under widely fluctuating power conditions. These systems must still be protected against heat, dust, humidity, and power fluctuations. These are now all manageable concerns.

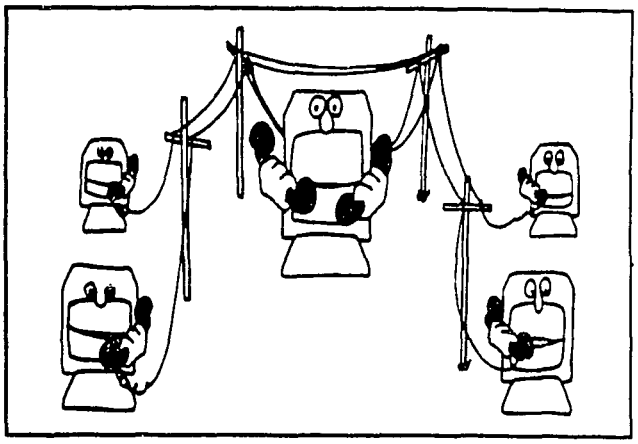
These computer systems bring a new capability for collecting, manipulating and generating data and information. With this new capability comes a sense of greater urgency to transmit this data and information to the home office or elsewhere where it can be processed. Traditional media, such as mail, do not lend themselves to efficient transmission of this data and information. They represent an unacceptable bottleneck in the transmission of computer-based data.

The application of computers to communication now presents an unprecedented capability for improving communication regardless of where the parties are physically located.

For all this great potential, they cannot replace other media. The challenge is not to find the one great medium for all communication but to have available as many appropriate media as possible.

7.2 Electronic Mail

Messages



Electronic Mail System

Electronic mail (E-mail) is a text-based store-and-forward message system where one or more computers act as an electronic post office. Such systems are common in networks. Users with modems and personal or laptop computers can access the host systems from virtually any telephone, even overseas.

There is an important distinction between an "office" and a "personal" E-mail account. An E-mail account is an electronic address. In most cases the first inclination is to use E-mail as you would a traditional mail box. One account serves as an address corresponding to a physical location, an office. Messages can, therefore, be sent to anyone who is physically at that office by way of that "office E-mail account." Certainly this is appropriate in many circumstances, such as when E-mail is used as an alternative to telex. For example, a company may assign a single E-mail account to each of its offices.

However, an office includes people who may need to communicate from other locations. It is the nature of E-mail that electronic addresses are not dependent on a physical location. E-mail can be sent and received from almost anywhere on the planet, provided the user has a personal E-mail account and a communications terminal. A personal E-mail account can be assigned to an individual who travels, rather than to a physical office at a specific location. This provides an unprecedented element of connectivity. Here we begin to get a glimpse of the true potential of E-mail.

International Gateways

For some organizations E-mail offers exciting possibilities for improved international communications. Many countries now or soon will provide access (often called "gateways") to the international data networks. These data networks provide cost efficient access to all major E-mail and computer conference systems.

Organizations have documented that using E-mail is definitely a cheaper alternative to Telex, plus it provides more confidentiality. They have reduced or eliminated Telex communication

between their home office and the field where the field has E-mail access. They also report that they have almost eliminated the need for voice telephone communication as well. This is especially true where time zone differences provide a limited opportunity for voice telephone communication.

Computer Conferencing

Computer conferencing (CC) is another application of E-mail which facilitates improved interpersonal communication. CC extends the application of E-mail to groups. E-mail may have sophisticated functions for automatically sending courtesy copies, blind copies, and simply forwarding messages to any number of people electronically, but the E-mail application is essentially one-to-one communication. CC uses the electronic communication environment to facilitate group discussions.

Many people first assume that this means all members of the group sign on to the electronic system at the appointed date and time for the purposes of communicating. This would be similar to the well-known "conference call" of the voice telephone medium. If this were the case, there would be little advantage of CC compared with the voice telephone conference call. One of the most liberating features of CC is the fact that members of the CC group sign on at their own individual convenience.

The host computer system (the same which handles E-mail) keeps track of which messages you have read and which have been entered since the last time you signed on. Messages in a CC are automatically sent to the designated members of the CC group. CC groups are formed around specific topics or to achieve a specific purpose for which group communication is required.

The concept on which computer conferencing is based has been around for some time on the electronic bulletin board systems (BBSs). BBSs simulate a community bulletin board; users can contact them via telephone and modem and post a message for other users to read. BBSs almost universally now have special interest groups (SIGs) where such messages are grouped under a topic. They all permit widely dispersed groups of people who would otherwise have no means or opportunity of communicating to share their common interests totally without regard to their physical location in time or space.

International associations have the opportunity of using CC and electronic bulletin board systems to facilitate major discussions of policy and administrative matters. They can share marketing and research information with relative ease and certainly much more cost effectively than traveling to international face-to-face conferences. Such meetings will always be necessary but can be far more productive if CC is used to lay out important issues in advance.

CC remains a largely untapped resource of computer-mediated communications.

File Transfers

Computer systems bring a new capability for collecting, manipulating, and generating data and information. With this new capability comes a sense of greater urgency to transmit this data and information elsewhere, where it can be processed.

Many E-mail systems now include the capability to transfer computer files. A file may contain data, computer programs, or text. For example, the file could contain a budget developed using spreadsheet application software.

A major advantage of file transfers is that the files may be compressed into a small, dense file before transmission. This can reduce transmission time dramatically.

Another advantage of binary file transfers is that the computers will usually verify that the exchange is absolutely perfect. Financial data, for example, has a low tolerance for error. Text, such as reports and memos, can tolerate more error as long as the meaning is not lost.

7.3 Direct Computer-to-Computer Communications

Ask others about local conditions and their experience with this procedure. Telephone lines may be too noisy. Long distance telephone charges may be expensive.

Direct Links May Be More Cost Effective

Telecommunications links through a gateway and an E-mail service may be expensive when you want to transmit large files. Under these circumstances, it may be more cost effective to connect your computers directly over normal voice telephone lines.

You may be able to use higher transmission speeds than the gateway and E-mail service permit. You bypass the gateway and E-mail online charges. Some high speed modems now use error correction technology that improves performance over noisy telephone lines. This improved performance may justify the higher cost.

Schedule a Connection

An E-mail service uses a host computer to store and forward messages and binary files. When you bypass this service, you must schedule a specific time when you can directly connect your computers.

The easiest means for doing this is to use communications software that permits unmanned connection at the receiving end. Arrange a window of time when this computer will be on and set up to receive an incoming call. Normal voice telephone lines may be used for this.

If your communications software does not permit remote operations, you must be sure that a computer operator is on hand at each end.

For international connections determine first from which end the call should originate. Often costs from one end will be one-half to one-tenth the rate from the other.

Use file-compression utilities to squeeze the file into the smallest space prior to transmission.

7.4 Modem Standards

General Operations

A modem converts digital information from your computer into a form that can be carried over the telephone line. This is called "modulation." It also converts it back, called "demodulation." A modem is a modulator/demodulator.

In some countries the government strictly controls the type and use of modems.

Speed

The most obvious standard from a layman's point of view is speed. Modems have been around since the 1950s. At that time speeds were rated at about 110 bps. "Bps" means bits per second. A bit is a single digit of information (digital information is always either 1 or 0, on or off, so a bit is either a 1 or 0).

More recently, speeds of 1200 and 2400 bps (sometimes also called "baud," which is equivalent to bps at slower speeds) are common. Modems with 9600 bps and higher speeds are dropping dramatically in price.

High speed modems might be worth their price. Each minute may cost US$10 or more for a direct connection over voice lines.

Command Sets

Modems also have a language by which your communications software can instruct their operation. This is sometimes called a command set. A popular standard command set was developed by Hayes Microcomputer Products, Inc. and is now used widely among manufacturers of personal computer modems.

Internal and External Modems

Modems may be external or internal. External modems are easily moved from one computer to another. They have their own power cord, which adds to the tangle of cords at a computer work station. They connect to the computer via a cable to a serial port on the back of the computer. This is yet another cable in the tangle. The telephone line connects to the modem, another wire in the tangle.

Internal modems are often cheaper. An internal modem is a card that fits in one of the slots on the motherboard. It requires no power cord. It uses the power supplied from the motherboard itself. It needs no cable to connect it to the computer since it is plugged directly into a slot. The telephone wire plugs directly into the modem card through a port in the back of the computer. It is not easy to move an internal modem to another computer. The system unit must be opened on both computers to do this.

Very small battery-powered modems are available that plug directly into the computer's serial port and require no cable or power cord. They are ideal for laptop computers. They also work easily with desktop computers.

Communications Protocols

Digital communications involve a confusing set of protocols, parameters, and standards. Usually, your communications software will deal with these automatically and satisfactorily. However, at times you may be faced with changing them directly. International users especially face these protocols. The following are common standards you may need to understand.

CCITT vs BELL

CCITT is an acronym for the United Nations Consultative Committee for International Telephony and Telegraphy. It was formed, in part, to set standards for FAX machines. It has since taken on important standards setting work for a broader range of digital media.

Bell standards were developed by the Bell Telephone Company in the USA.

At speeds below 2400 bps you may find a conflict between the CCITT standards and the Bell standards (which most US made modems follow). If you intend to use a modem in Europe or European influenced countries, check with your local Post, Telephone and Telegraph (PTT) agency or gateway operators to find out what standard they use. Most better quality modems can be adjusted to work at any standard.

Data Bits, Stop Bits, and Parity

Sending and receiving modems must agree on what constitutes a single byte or data word. Data bits may be set to 7 or 8, and stop bits may be used to help identify bytes or data words. Parity may be even, odd, or none. Communications software use parity to help reduce errors in communications.

A common standard for these three communications parameters among US-based bulletin board systems is 8 data bits, no parity, and one stop bit. This is commonly abbreviated as "8N1." Gateways and E-mail systems may even be able to sense whatever parameters you are using and adjust themselves accordingly.

Echo and Duplex

Some systems automatically echo everything you send them so that you will see on your screen each key that you type. This is called "full duplex." The "local echo" option should be set off, otherwise you will see double of every key you press. "Half duplex" operation does not echo back to you each key you press. In this case you want local echo to be on, otherwise you will not see what you type, only what originates from the remote system.

7.5 Communications Software

Communications software enables you to easily use your modem to connect with remote computer systems. Most of them allow you to automate sign-on routines. This is important. Once you set the communications parameters and program the software to respond correctly to the sign-on prompts, you may never need to change it or even remember it.

These automated routines are sometimes called "script files."

Communications software can also pretend that your personal computer is a mainframe or minicomputer terminal. This allows you to communicate easily with mainframe and minicomputer systems.

Sophisticated communications software will dial up any number of different systems and perform operations at a specified time without you. This can help reduce communications costs and will facilitate direct computer-to-computer links across time zones.

Start with inexpensive communications software. There are many shareware and public domain versions available. Be careful. This is a common source of computer virus infection. Avoid costly packages where you may be paying for features that you will never use.

7.6 Mailing Diskettes

When This is Cost Effective

The broad presence of computers offers new opportunities and demands for transferring large quantities of data as part of an overall data-processing system. The most obvious means for doing this is by sending diskettes through the mail.

This may be most cost effective when the size of the computer files is too large to effectively transmit via modem. It may also be cost effective when the urgency of the transmission can tolerate the delay of using normal mail or courier services.

Naturally, if telecommunications is not available at all, then this becomes virtually your only option.

Guidelines

Always include a hard-copy printout of the data in case the diskette is damaged en route. Send two diskettes, one serving as back-up.

Check with local postal and courier service regulations. They may prohibit sending diskettes or place restrictions on the service.

7.7 Communications Trends

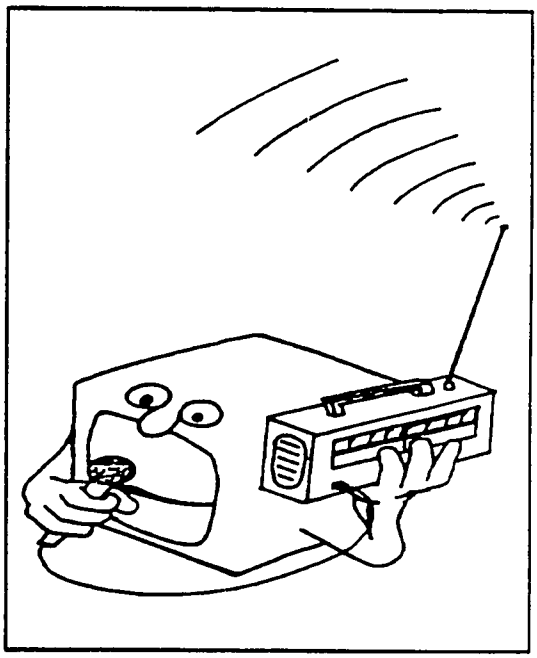
PC/Fax Boards

FAX machines are, in fact, specialized computers. Personal computers can serve some FAX functions when fitted with a "FAX board."

There are significant disadvantages to using your personal computer as a FAX machine. In order to receive a transmission, your computer must be on and running the appropriate software for FAX reception. This software may run in "background" while you use the computer for other things, but such multi-tasking often leads to problems in computers which are designed to do one task at a time. To adequately print out the received FAX, you will need a laser or inkjet printer unless you have a high tolerance for the noise and poor graphics resolution of a dot matrix printer.

FAX boards for personal computers work fine for sending text files generated using word-processing software on that same computer or one like it. However, if you have a paper document to send, then you will need a fairly expensive scanner to convert its image to a digital graphics file. This file can then be sent as a FAX image via your computer and FAX board.

So, to use your Personal Computer as a FAX machine may require more investment than simply buying a dedicated FAX machine outright.



Packet Radio

Packet Radio

A radio-modem links radio transceivers to computers. This is sometimes referred to as packet radio since the process involves the preparation and transmission of discreet packets of data.

Radios can communicate this packet data over short distances in the same manner as voice communications. For long distances a low orbit satellite can receive shortwave radio transmissions of packet data. The satellite stores the data and forwards it to the receiver on demand. The sender and receiver can be anywhere, literally, on earth. Combination

computer/radio stations that can take advantage of this may cost only about $2000 and operate on batteries.

To use this technology legally, you must first have a licensed radio frequency. Obtaining a licensed frequency may be a long and involved process. Hobbyists may use amateur radio frequencies, but only for amateur purposes.

There are no commercial packet radio services at this time. You may require special technical assistance to link a packet radio system to an E-mail system.

Packet radio technology, however, is ideal for remote locations where other media, especially telephone services, do not exist.

Write in the space below. Who should you talk to about telecommunications? Use pencil.

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8.3 Select and Acquire Hardware 119
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8.5 Manage the System 121
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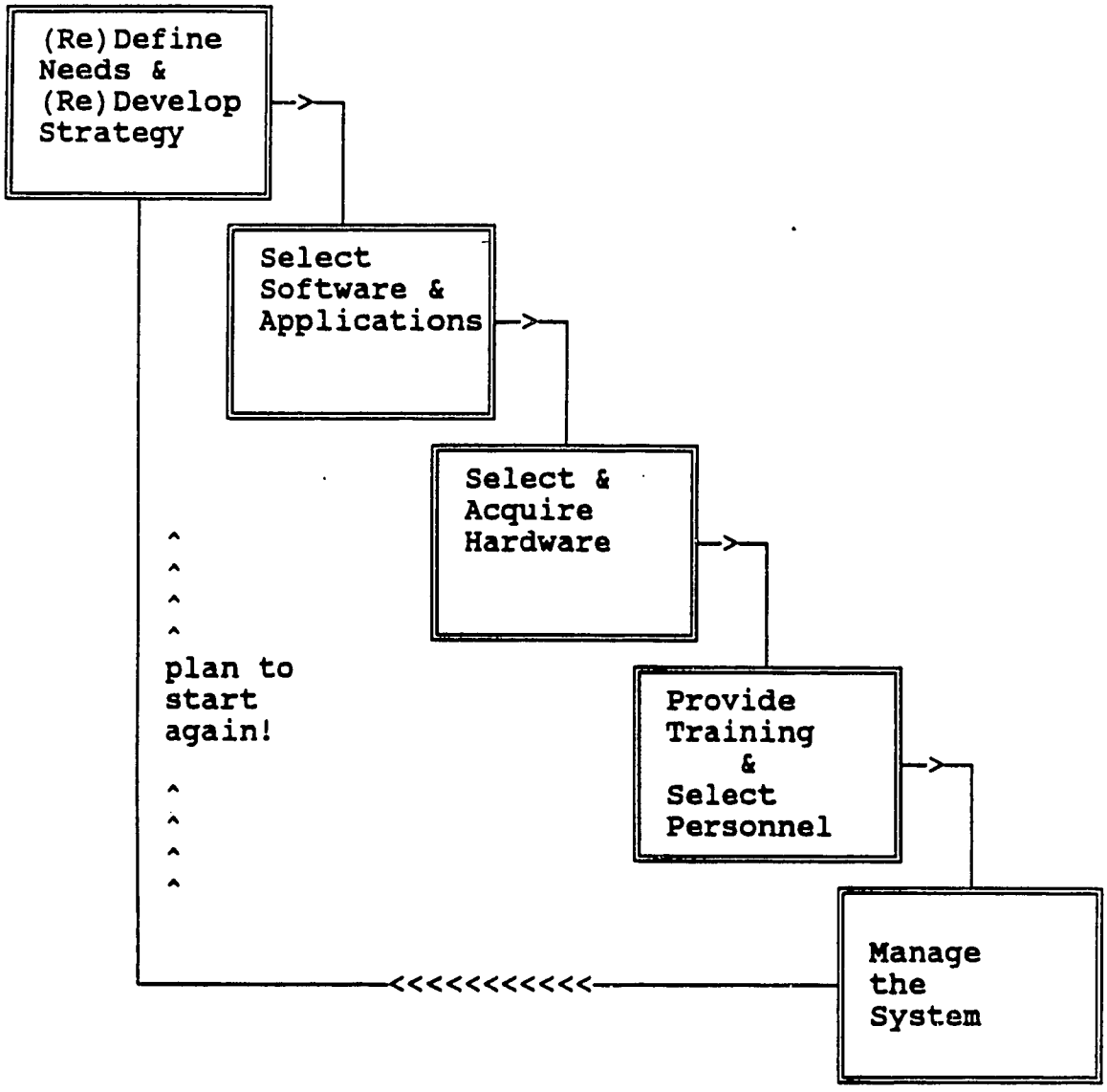
Make general notes about your strategy in the space below. Who should work with you to develop your computerization strategy? List their names. Use pencil.

Chapter 8: Putting it all Together

Use this chapter to help you develop and implement a computerization strategy. Photocopy the checklists and use them. Add your own items to the checklists in the space provided.

In Chapter 1 we illustrated five phases for any computerization strategy. However, the process does not end with the fifth stage of managing your system. Computerization and information management become a continuous process. Keep current with the technology and plan to begin redefining your data processing needs as soon as your initial system is operating.



The Computerization Process Continues!

8.1 Define Needs and Develop Strategy

Note: Add your own items in the space below. Use extra paper if needed. Use pencil.

( ) What are your fundamental data-processing objectives for this computer system?

( ) Are you sure a computer system is the most cost-effective means for achieving these objectives?

( ) Can you write down the three most important questions that you expect the computer system to answer?

( ) Have you discussed this with those who will be most affected by computerization?

( ) Do you have a budget for the computerization program?

( ) Have you allowed sufficient time to accomplish all phases of the computerization process? One year? Two years?

8.2 Select Software and Applications

Note: Add your own items in the space below. Use extra paper if needed. Use pencil.

( ) What standard word processing, spreadsheet, database management, and communications software are others using in your area? Will they meet any of your data-processing needs?

( ) Do you intend to use this computer system for critical data processing? Have you established a clear and generous time frame for installing this system?

( ) Have you identified commercial packages software for your critical applications? Are you going to try to develop custom software?

( ) Will you be using telecommunications? Have you selected a modem? What modem specifications are standard in your country? Do you need to apply for gateway and E-mail service priveleges?

8.3 Select and Acquire Hardware

Note: Add your own items in the space below. Use extra paper if needed. Use pencil.

( ) Will all your selected software work well on this computer? How do you know? Can you verify this with other users?

( ) Will you start with a few stand-alone systems and then use them in a network?

( ) Will you need a centralized system with a client-server? If so, what network operating system have you chosen? Why?

( ) What warranties will the equipment have? How soon can you have any equipment repaired or replaced? Is this soon enough?

8.4 Provide Training

Note: Add your own items in the space below. Use extra p[illegible] if n[illegible]ded. Use pencil.

( ) Which department will be responsible for the computer system? Do you need to create a new computer department?

( ) Who will be responsible for the computer system?

( ) Do you have a training strategy for your system supervisor (even if this is a part-time responsibility)?

( ) If your designated system supervisor is not available, who will assume his/her responsibilities?

( ) Do you have a training strategy for management?

( ) Who else will be using the computer system? Do you have a training strategy for them?

( ) Will you need temporary staff to assume your permanent staff's duties during their training period?

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8.5 Manage the System

Note: Add your own items in the space below. Use extra paper if needed. Use pencil.

( ) Where will the computer equipment be installed? Who will install it?

( ) Will the computers have clean, grounded electrical supplies?

( ) What power protection devices will you need for your computers? How do you know they will be appropriate?

( ) Will computer stations have sufficient work space?

( ) Is there a reliable source of computer supplies in your area? What supplies should you purchase with your equipment? When should you plan on reordering them?

( ) Are the computer rooms secure from theft, heat, dust, humidity?

( ) Have you budgeted enough money for ongoing training for computer users?

( ) Have you budgeted for maintenance, repair, and computer supplies?

( ) Do you have clear regulations for access and use of the computers so that you can minimize risk from computer viruses?

( ) Who will repair your computer equipment when it breaks down?

( ) How soon will you have your equipment repaired or replaced? Will you be able to continue your critical data processing during this period?

( ) Does your training strategy include preventive maintenance routines?

8.6 Keep Current with Technology

Note: Add your own items in the space below. Use extra paper if needed. Use pencil.

( ) Have you subscribed to one or two computer magazines or newsletters? Will they be circulated among all staff who are interested?

( ) Does your strategy include upgrading or replacing equipment within the next five years? Three years? Two years?

( ) Have you identified and supported local user groups and computer societies? Do they have annual conferences? Whom will you send from your organization?

( ) Have you scheduled an annual review of your data-processing operations? When? Who will participate? Who is responsible for conducting and documenting the review?

Appendix: Annotated Bibliography of Industry Magazines

The following list represents some leading magazines in the computer industry. You may find them useful.

Look for publications that specifically address the data-processing needs in your country or region. They will contain important information of particular relevance to you.

BYTE

BYTE has a reputation for being one of the most comprehensive monthly magazines in the microcomputer industry. Consequently, it is quite large, containing usually more than 300 pages per issue. It is oriented towards professionals and may be highly technical. It covers all areas of the microcomputer industry.

Many professionals consider it required reading. It is indexed for useful reference.

Contact McGraw-Hill, Inc., One Phoenix Mill Lane, Peterborough, NH 03458, USA.

Databased Advisor

This monthly publication is oriented towards users and programmers of database applications.

Contact Data Based Solutions, Inc., 1975 Fifth Ave., San Diego, CA 92101, USA.

DBMS

This is another monthly publication that serves the users and programmers of database applications.

Contact DBMS at P.O. Box 57511, Boulder, CO 80322-7511, USA.

INFO World

This is a weekly publication providing up-to-date reports on changes and developments in the microcomputer industry. Since it is a weekly publication, it is relatively more expensive then monthly publications.

Contact InfoWorld, P.O. Box 3014, Northbrook, IL 60065, USA.

LINK-UP

Link-Up is published six times per year, every other month. It is a relatively new publication. If focuses on telecommunications, including major database services.

Contact Learned Information Inc., 143 Old Marlton Pike, Medford, NJ 08055-8750, USA.

PC/Computing

This monthly publication is oriented towards general microcomputer users and professionals. It contains helpful, practical advice and suggestions for general computer users. It also reviews new products. Published by Ziff-Davis Inc.

Contact PC/Computing, P.O. Box 58229, Boulder, CO 80322-8229, USA.

PC Magazine

This is a comprehensive magazine published almost every two weeks (22 issues per year). It includes articles and product reviews aimed at a wide audience from the novice to the professional.

Contact PC Magazine, P.O. Box 54093, Boulder, CO 80322-4093, USA. Telephone 800-289-0429.

PC Week

PC Week is a weekly publication of the Ziff-Davis Company. It provides up-to-date information on changes and developments in the industry. Oriented towards professionals. Expensive relative to monthly publications.

Contact Customer Service Department, PC Week, P.O. Box 1770, Riverton, NJ 08077-7370, USA.

PC World

PC World is a monthly publication oriented towards users and professionals. It also includes useful, practical advice and tips for users. PC World product reviews are carefully monitored by the industry. A very readable publication.

Contact Subscriber Services, P.O. Box 55029, Boulder, CO 80322-5029, USA.

Software Magazine

This monthly publication is devoted to the software side of the industry. It is oriented towards mini and mainframe applications. For the professional only.

Contact Software Magazine, P.O. Box 542, Winchester, MA 01890, USA.

BCS Publications

The Boston Computer Society is an international organization with tens of thousands of members. They are organized into special interest groups. The main organization distributes a monthly BCS Update publication to all members. The special interest groups often publish their own newsletters. Membership includes the main publication and several special interest publications of your choice.

It is heavily focused on US-based computer users and on BCS activities in the Boston vicinity. It also includes many interesting and useful articles of general interest. Orientation is towards new and general computer users, not necessarily computer experts.

As of this writing, memberships cost $39 per year and includes the BCS Update and one special interest publication. A real bargain.

For membership information contact The Boston Computer Society, One Kendall Square, Cambridge, MA 02139-1562, USA.

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Appendix C

Cooperative Software Study

CONSULTANCY REPORT

ON

COOPERATIVE SOFTWARE SURVEY

INNOVATIVE APPROACHES TO COOPERATIVE MANAGEMENT, FINANCE AND TRADE

USAID COOPERATIVE AGREEMENT
OTR-0192-1-00-8241-00

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June, 1990

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LIST OF ACRONYMS

ACDI	Agricultural Cooperative Development International
Co-op Council	Wisconsin Cooperative Development Council
FAX	Facsimile machine
IBM	International Business Machines, Inc.
NCCI	North Central Computer Institute
PC	Refers to a microcomputer or specifically to an IBM personal computer or clone

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EXECUTIVE SUMMARY

I. INTRODUCTION

The Wisconsin Cooperative Development Council was engaged by Agricultural Cooperative Development International in February 1990 to conduct a study of cooperative computer software. The study was conducted under the Innovative Approaches to Cooperative Management, Finance and Trade project financed by the U.S. Agency for International Development under Cooperative Agreement OTR-0192-1-00-8241-00.

II. GOAL AND SCOPE OF STUDY

The goal of the study is to identify existing, relevant agricultural and cooperative-related software packages used by U.S. agricultural cooperatives and to recommend to ACDI software packages to introduce to cooperatives in developing countries. The scope of work for the project included:

1) Developing a methodology for conducting a survey on computer software used by agricultural cooperatives in the United States.

2) Conducting a survey of agricultural cooperatives in the United States.

3) Classifying relevant software packages into three categories: customized; modified; off-the-shelf.

4) Preparing a literature review of cooperative oriented software and co-operative oriented applications of the most "generic" type of software.

5) Compiling information from feasibility studies concerning the types of software currently in use in the target countries (Costa Rica, Egypt, Honduras, Indonesia, and The Philippines).

6) Making recommendations concerning: opportunities to improve operating efficiencies by introducing various software packages in the countries; sponsorship of an international computer users group for cooperatives to learn from each other how to make the best use of the software at their disposal; whether or not ACDI should promote standardization of software for cooperatives be endorsing certain products; and if ACDI should contract to develop or modify a line of relevant software.

7) Recommending the most appropriate language for software if customization is part of the recommendation.

III. METHODOLOGY

To gather information on the types of computer software agricultural cooperatives in the United States utilize, a sample of 63 cooperatives was selected and telephone interviews were conducted with personnel at the cooperatives. Of the 63 cooperatives , 53 agreed to participate in the study. Questions about the size of the cooperative and the types of computer software utilized by the cooperative were asked during the interviews.

Additional information was gathered from: telephone calls to software developers and vendors; a literature review of computer software designed for agricultural cooperatives; and a search of the North Central Computer Institute's AGCITES database. To compare the utilization of U.S. agricultural cooperatives with their developing country counterparts, information was gleaned from the feasibility studies prepared by ACDI for Costa Rica, Egypt, Honduras, Indonesia, and the Philippines.

IV. FINDINGS

The cooperatives that participated in the study varied in size and in the type of computer systems they utilized. Reported annual sales from the cooperatives interviewed ranged from $125,000 to $2.4 billion. Local cooperatives tended to be on the low end or middle of the scale while regional and marketing cooperatives tended to be in the higher end of the scale. The four cooperatives included in the "other" category were split between the lower and higher end of the scale. Computer systems also tended to vary based on type of cooperative. Although all cooperatives interviewed indicated that they utilized computers, local cooperatives tended to use PC networks or minicomputers; regionals reported using mainframe computers; marketing cooperatives were almost evenly divided between minicomputers and mainframes; and "other" cooperatives reported using either PC networks, minicomputers or mainframe computers.

U.S. Agricultural cooperatives were also found to make uses of facsimile machines (FAX), external electronic mail services, and electronic information services. Sixty six percent of the cooperatives surveyed indicated that they used FAX machines. Thirty four percent of cooperatives indicated that they subscribed to external electronic mail services. Nineteen percent of cooperatives indicated that they utilize electronic information services for market and credit information. The participants in the study were also asked if they communicated via computer to remote locations, regionals, locals, or other cooperatives. In all, 36 cooperatives (68%) indicated that they did utilize computer based communications.

All but two of the cooperatives interviewed stated that they used accounting software. Overall, most cooperatives were satisfied with their accounting package. Twenty one of the cooperatives indicated that their accounting software was customized or developed in-house. Fourteen cooperatives indicated using "off-the-shelf" software, nine indicated using software that was purchased "off-the-shelf" but had some modifications made to it by the vendor/developer to better suit the needs of the cooperative; and seven indicated that their accounting software package had been substantially modified for their use. The study identified and gathered information on nineteen "brand name" accounting packages.

Compared to accounting software, less information was provided by the cooperatives on the types of operations-related software they utilized. Twenty three cooperatives indicated using one or more software packages usually related to the areas of feed rationing and fertilizer mixing. In all, fourteen operations-related software packages were identified from the interviews. Several other operations-related software packages were found through a review of related literature and from a search conducted within the AGCITES database.

Computer usage by U.S. agricultural cooperative was found to be more extensive than that of cooperatives in the five developing countries. The feasibility studies reported that the use of computers by cooperatives tended to be limited to PCs. Unlike U.S.

cooperatives, cooperatives in the developing countries tended not to utilize integrated accounting packages or operations-related software, nor did they make use of computer based communications. The lack of computer vendors, computer support and the poor quality of telecommunications in most of these developing countries were several factors that inhibited the wide use of computers by cooperatives.

V. CONCLUSIONS AND RECOMMENDATION

The types of computer systems, the type of accounting and operations-related software and the degree to which a cooperative utilized computer based communications varied to some degree between the types of cooperatives that participated in the survey of U.S. agricultural cooperatives. Even with these variations, U.S. agricultural cooperatives were found to use computers more extensively than their developing country counterparts. All but two of the cooperatives surveyed indicated that they used accounting software packages (19 "brand name" accounting packages were identified). Twenty one U.S. cooperatives indicated that they utilized operations-related software (14 software packages were identified).

The feasibility studies prepared on cooperatives in the five developing countries stressed the need for integrated software packages. They also implied that cooperatives in the developing countries were not utilizing operations-related software packages. The studies, however, were not specific on the types of operations-related software that would be of most use to the cooperatives. Based on the information gathered on U.S. agricultural cooperatives and the stated computer capacity and needs of developing country cooperatives, five recommendations are made.

Recommendation 1. Any computer software introduced by ACDI should be designed for PCs or PC networks.

Recommendation 2. Due to the poor telecommunication systems found in most developing countries, computer based communications is not practical for most cooperatives and should not be encouraged unless telephone systems improve or an alternative to communicating over telephone lines can be found.

Recommendation 3. From the list of "brand name" accounting software packages identified, four (SRE Co-op Accounting System, Burke Cooperative Accounting System, FARMS, PATRON, Red Wing System and Agris Sales Accounting & Patronage System) should be examined in further detail prior to ACDI introducing an accounting package to cooperatives in developing countries.

Recommendation 4. Specific types of operations-related software packages (feed rationing; fertilizer mixing; fruit,vegetable and nut production; fruit, vegetable, nut and grain storage; and fish catching and processing) should be explored to determine their relevancy to the needs of cooperatives in developing countries before a recommendation is made on specific operations-related packages.

Recommendation 5. Once accounting and operations related software packages have been selected by ACDI for introduction to developing country cooperatives, user groups should be established for each software package.

I. INTRODUCTION

In February 1990, the Wisconsin Cooperative Development Council (Co-op Council) was engaged by Agricultural Cooperative Development International (ACDI) to conduct a cooperative computer software survey. The study was conducted under the Innovative Approaches to Cooperative Management, Finance and Trade Project financed by the U.S. Agency for International Development under Cooperative Agreement OTR-0192-1-00-8241-00.

In Conducting the study, the Co-op Council gathered information through interviews from 53 agricultural cooperatives in the United States. Information on cooperatives in developing countries was gathered from feasibility studies prepared on five developing countries. Additional information on computer software and computer systems was gathered through conversations with computer software vendors and developers.

The report is divided into four sections. The first section is describes the **Goal and Scope of Work** of the project. The **Methodology** section explains how data was gathered and how cooperatives were selected to be included in the study. The **Findings** section provides a summary of the information gathered from the following sources: interviews with cooperative personnel and software developers/vendors, the developing country feasibility studies, a review of related literature and other sources. The Findings section also contains information on specific software packages (accounting and operations-related) along with background information on the cooperatives that participated in the study. Finally, the **Conclusion and Recommendation** section recommends to ACDI software packages that should be further examined before ACDI selects a package(s) to introduce to cooperatives in the five developing countries. The Conclusion and recommendation section also suggests a methodology to be used by ACDI in selecting a package(s).

II. GOAL AND SCOPE OF WORK

The goal of the project is to identify existing relevant agricultural and cooperative-related software packages used by cooperatives in the United States and to provide recommendations to ACDI regarding which software packages to introduce to cooperatives in developing countries. To accomplish this goal, the scope of work for the project included:

1) Developing a methodology for conducting a survey on computer software used by agricultural cooperatives in the United States.

2) Conducting a survey of agricultural cooperatives in the United States.

3) Classifying relevant software packages into three categories: customized; modified; off-the-shelf.

4) Preparing a literature review of cooperative oriented software and cooperative oriented applications of the most "generic" type of software.

5) Compiling information from feasibility studies concerning the types of software currently in use in the target countries (Costa Rica, Egypt, Honduras, Indonesia, and the Philippines).

6) Making recommendations concerning: opportunities to improve operating efficiencies by introducing various software packages in the countries; sponsorship of an international computer users group for cooperatives to learn from each other how to make the best use of the software at their disposal; whether or not ACDI should promote standardization of software for cooperatives by endorsing certain products; if ACDI should contract to develop or modify a line of relevant software.

7) Recommending the most appropriate language for software if customization is part of the recommendation.

Although this study aimed at identifying as many software packages used by agricultural cooperatives as possible, it is not intended to be an exhaustive list of computer software utilized by agricultural cooperatives in the United States. Nor is it the report's intent to describe each software package identified in detail. Through the information contained in this report, it is hoped that several software packages will be selected to be examined more thoroughly to determine the applicability to cooperatives in developing countries.

III. METHODOLOGY

Telephone and in-person interviews were used to gather information on the types of software programs used by cooperatives in the United States. It was the opinion of the consultants that using interviews as the method of gathering information about cooperative computer software usage would result in a higher response rate and would enable the gathering of higher quality information than a mail survey.

A questionnaire was developed to assist in the gathering of information. The questionnaire (see Appendix A) contained both open ended and multiple choice closed-ended questions. The questionnaire had two parts: the first part asked for basic information about the cooperative (i.e. type of cooperative; size, number of members, affiliation; computer system, etc.); the second part of the questionnaire was used to gather specific information on the computer software used by the cooperative.

Prior to completion of a "final draft" of the questionnaire, face-to-face interviews were held with office managers from three different cooperatives to determine the effectiveness of the questions and the questionnaire format. In addition, the list of questions was examined by ACDI. Comments by ACDI staff members were incorporated into the final draft before the survey was conducted.

A. Sampling Technique and Description of the Sample

Sixty three cooperatives were included in the sample (a list of the cooperatives is contained in Appendix B). The sample consisted of 37 "local" cooperatives, 12 regional cooperatives, 10 marketing cooperatives, an artificial insemination cooperative, a feed mill owned by a regional cooperative, a cooperative consisting of marketing cooperatives and a cooperative consisting of regional cooperatives. Of the sixty three cooperatives in the only 10 refused to participate in the study or did not return telephone calls. The 53 cooperatives that agreed to participate in the survey included: 31 "locals", 11 regionals ,7 marketing, an artificial insemination cooperative, a feed mill owned by a regional, a cooperative consisting of marketing cooperatives and a cooperative consisting of regional cooperatives. The marketing cooperatives marketed: cane sugar, nuts, fruit, rice, olives, cherries, and livestock.

Several techniques were used in compiling the sample. First, regional and marketing cooperatives were selected using the National Council of Farmers Cooperative Directory. When selecting regional cooperatives an effort was made to compile a geographically diverse sample. In selecting marketing cooperatives for the sample, consideration was given to location and to the types of products marketed. The consultants sought to include marketing cooperatives that marketed items similar to those marketed by the cooperatives in the five developing countries. For the most part, local cooperatives were selected based on conversations with representatives of the regional cooperatives. Local cooperatives were also selected based on conversations with computer software companies and with other organizations providing services to local cooperatives. In order to attempt to create a representative and diverse sample of local cooperatives, consideration was given to the size, location and, when known, the type of computer software used by the cooperative.

B. Interviews

Telephone calls were made to the cooperatives included in the sample. When a contact name was not provided prior to the telephone call, a request was made to speak to either the office manager or to the person most familiar with the cooperative's computer system. For regional cooperatives, requests were made to speak to personnel in the information service department and to personnel in the member service department to learn what computer software the local cooperatives affiliated with the regional were using. Service bureau personnel were asked to provide the names of local cooperatives and contact people at the local cooperatives. Interviews lasted approximately forty five minutes to one hour.

Participants were asked to list and describe the software packages used by their cooperatives. Emphasis was placed on accounting software packages. In cases were software was developed by someone outside the cooperative, participants were asked to give the name and telephone number of the software developer or of the vendor from whom they purchased the software. Telephone calls were made to the software developers/vendors to gather additional information on the specific software package and to request written materials on the package.

Based on the information gathered from the cooperatives and from the software developers, computer software packages were classified based on the platform on which they operated (i.e., mainframe, mini-computer, or micro computer [PC]) and on whether the software could be purchased off-the-shelf, was a customized product or was a product that would require modification to meet the needs of a cooperative.

C. Literature Review

A literature review was conducted on cooperative oriented software. Searches were conducted using the term "agricultural cooperative computer software" and "cooperative computer software". In some cases the names of specific cooperative-related computer software packages were used as search terms in an attempt to uncover additional information. Searches were conducted using the Business Periodical Review and the AGRICOLA (1985-1990) computerized database.

D. Additional Information on Computer Software

Additional information on computer software utilized by agricultural cooperatives was gathered through conversations with accounting firms specializing in providing services to the cooperative sector and through conversations with staff at the University Center for Cooperatives in Madison, Wisconsin and with the California Center for Cooperatives in Davis, California.

The North Central Computer Institute (NCCI) located in Madison, Wisconsin was also contacted. NCCI developed and manages a software database called AGCITES which contains over 1,800 commercial and university developed agricultural program citations. From AGCITES, lists of software programs were compiled for the following areas: marketing, crop storage, grain elevator industry, fruits/vegetable industry, beef feedlot management and agricultural dial-up services. (The list are contained in Appendix D).

E. Computer Software Used by Cooperatives in Target Countries

Information on the computer software used by cooperatives in ACDI's five target countries was gathered from feasibility studies prepared for ACDI. From the information, tables (Appendix E) were prepared categorizing the countries according to the extent to which different types of cooperatives were present, the degree of cooperative centralization, the degree to which the cooperatives were computerized, the availability of computer hardware, software and support in the country, the degree of electrification in the country and the quality of the country's telecommunications infrastructure.

IV. FINDINGS

A. Size of Cooperatives

The size of the cooperatives that participated in the survey ranged in sales from $125,000 to $2.4 billion. Table 1 provides a breakdown of the cooperatives by type and annual sales volume.

Table 1
Type of Cooperative by Annual Sales

Annual Sales	Local	Regional	Marketing	Other	Total
Under $1 million	0	0	1	0	1
$1 mil. - $4.9 mil.	4	0	0	1	5
$5 mil. - $9.9 mil.	5	0	0	1	6
$10 mil. - $14.9 mil.	6	0	0	0	6
$15 mil. - $19.9 mil.	4	0	0	0	4
$20 mil. - $29.9 mil.	4	0	1	0	5
$30 mil. - $49.9 mil.	2	0	0	0	2
$50 mil - $99.9 mil.	2	0	2	0	4
$100 mil. - $499.9 mil.	1	3	3	1	8
$500 mil. - $999.9 mil.	0	1	0	1	2
$1 billion and over	0	5	0	0	5
Don't Know	3	2	0	0	5
Total	31	11	7	4	53

B. Computer Systems

The extent of computerization and the cost of computer systems used by the cooperatives also varied. Table 2 shows a breakdown of the cooperatives by type and by computer system utilized. Table 3 provides a breakdown of cooperatives by type and by cost of computer system.

All of the cooperatives included in the survey had at least one micro level (PC) computer. All of the regional cooperatives utilized expensive mainframe computers. Marketing cooperatives were almost evenly divided between those that used PCs, those that used minicomputers and those that used mainframes. Most local cooperatives utilized PC networks or minicomputers while cooperatives included in the "other" category utilized either PC networks, minicomputers or mainframe computers.

Table 2
Type of Cooperative by Type of Computer System

Type of Computer System	Local	Regional	Marketing	Other	Total
No Computer System	0	0	0	0	0
PC	5	0	2	0	7
PC Network	13	0	0	1	14
Minicomputer	13	0	3	1	17
Mainframe	0	11	2	2	15
Don't Know	0	0	0	0	0
Total	31	11	7	4	53

Many interviewees (21 cases) were unable to estimate the cost of the computer system used by their cooperative. For the thirty-two cooperatives where cost information was available, reported computer system costs ranged from a low of $3,000 to a high of $5 million. Most local cooperatives reported computer system costs of less than $50,000. Most regional, marketing and "other" cooperatives reported computer system costs of over $50,000.

Table 3
Type of Cooperative by Computer System Cost

Computer System Cost	Local	Regional	Marketing	Other	Total
Less than $10,000	0	0	1	0	1
$10,000-$19,999	2	0	0	0	2
$20,000-$29,999	4	0	0	0	4
$30,000-$49,999	8	0	0	0	8
$50,000-$99,999	4	0	2	0	6
$100,000-$199,999	4	0	0	1	5
$200,000--$499,999	1	1	1	1	4
$500,000-$999,999	0	0	0	0	0
$1 million and Over	0	0	1	1	2
Don't Know	8	10	2	1	21
Total	31	11	7	4	53

C. Communications

The survey included questions on the usage of facsimile (FAX) machines, electronic mail (e-mail or electronic bulletin boards) and electronic information systems (such as market information services, credit bureau services, etc.). The survey also asked cooperatives if they communicated via their computer system with remote locations (i.e. to branches, locals to regionals, regionals to locals, cooperatives to members). Table 4 shows a summary of the responses received.

Table 4
Utilization of Various Forms of Communication by Type of Cooperative

Communication Activity	Local	Regional	Marketing	Other	Total
Fax					
Don't Use	7	0	1	0	8
Light Use	7	0	1	0	8
Medium Use	5	0	0	1	6
Heavy Use	7	7	5	2	21
Don't Know	5	4	0	1	10
Total	31	11	7	4	53
Electronic Mail (external)					
Don't Use	24	4	4	3	35
Use	1	3	1	1	6
Don't Know	6	4	2	0	12
Total	31	11	7	4	53
Elect. Info.Services					
Don't Use	20	0	3	1	24
Use	5	4	1	0	10
Don't Know	6	7	3	3	19
Total	31	11	7	4	53
Computer-Based Communication With Remote Locations or Local/Regional Co-op					
Don't Use	10	0	3	1	14
Direct Dial-up	10	4	0	1	15
Dedicated Lines	7	0	2	1	10
Direct Dial-up/Dedicated Lines	4	6	0	1	11
Don't Know	0	1	2	0	3
Total	31	11	7	4	53

FAX machines were utilized by most cooperatives in all four cooperative categories. Regional, marketing and "other" cooperatives were most likely to utilize FAX machines. Most cooperatives in these three categories that indicated using FAX machines indicated that they were heavy users (more than 100 pieces per month). Local cooperatives that indicated using the FAX machine were almost evenly divided between those that used them heavily and those that indicated medium use (50-100 pieces per month) and those that indicate light use (under 50 pieces per month).

External electronic mail services were not commonly used by the cooperatives that participated in the survey. Regional cooperatives were more likely to subscribe to an e-mail service than the other cooperatives. Regional cooperatives were also more likely to utilized internal e-mail systems operated from the cooperative's main frame and used by personnel within the cooperative.

Cooperatives were asked if they subscribed to any electronic information services. In all, only ten cooperatives indicated that they did subscribe. Most of the services subscribed to either provided information on markets or were credit bureau services.

The questionnaire also asked whether or not cooperatives utilized computers to communicate with remote locations (a local cooperative with more than one location or a regional or marketing cooperative with several divisions or operating units; a local to communicate with a regional, or a regional to communicate with a local). In all, over 36 cooperatives stated that they utilized computer based communications; fourteen indicated that they did not use computer based communications (10 locals, 3 marketing and 1 "other"). Regional cooperatives were most likely to used computer based communications followed by local cooperatives, "other cooperatives" and finally marketing cooperatives. Cooperatives that communicated via the computer utilized dedicated phone lines, direct dial-up (communicating over non-dedicated lines) or a combination of the two.

D. Computer Software

Cooperatives were asked to identify the types of computer software they used. Follow-up questions aimed at gathering detailed information were asked for each software package identified. The survey did not concern itself with "common" software such as word processing or spreadsheet software. In many cases interviewees were able to identify and talk in detail about only one or two software packages utilized by their cooperative. In some situations, initial interviewees provided the names and telephone numbers of other personnel in their cooperative who could provide more detailed information about a specific software package. In most situations due to time constraints, detailed information was gathered on only one software package. Usually this software involved an accounting package. Since in many cases, consultants were not able to gather detailed information on operations-related software (manufacturing, feed ration formulation, fertilizer formulation, etc.) information gathered through the interviews was supplemented with information from the North Central Computer Institute's AGCITES Database. Lists of operations-related computer software compiled from AGCITES is contained in Appendix D.

1. Accounting Software

Of the 53 cooperatives that participated in the study, 51 indicated that they utilized accounting software. Fourteen cooperatives indicated that they used "off-the-shelf" software; 9 indicated that they used software that was purchased "off-the-shelf" but had some modifications made to it by the vendor/developer to better suit the particular needs of the cooperative; 7 indicated that the software they utilized had been substantially modified for their use; and 21 cooperatives indicated that their accounting software was customized or developed in-house. Table 5 provides a summary of the type of accounting packages utilized by the cooperatives.

Table 5
Type of Cooperative by Type of Accounting Software

Type of Accounting Software	Local	Regional	Marketing	Other	Total
No Accounting Software	0	0	2	0	2
Off-the-Shelf	13	0	0	1	14
Off-the-Shelf/Modified	9	0	0	0	9
Modified	7	0	0	0	7
Customized/In-House	2	11	5	3	21
Don't Know	0	0	0	0	0
Total	31	11	7	4	53

Local Cooperatives were most likely to use "off-the-shelf" accounting software or accounting software that required some modification. Regional, marketing and "other"cooperatives overwhelmingly reported the use of customized accounting packages or accounting packages developed in-house. This is not surprising considering the size of these cooperatives' operations and the size of their computer systems.

Table 6 contains summary information on the "off-the-shelf", off-the-shelf/modified and modified accounting software packages identified by the cooperatives that participated in the survey. The table also contains information on cooperative accounting software packages not utilized by the cooperatives in the survey. Information on these packages was acquired from vendors or developers. Appendix C includes additional information about the software packages identified. Unless indicated by an asterisk, all packages are available for purchase, or in the case of software developed by a regional for its locals, the developers would be willing to explore selling the package to an organization like ACDI.

For the most part, interviewees indicated that they were satisfied with their accounting software package and that the package had met their needs. However, since the only accounting software package that many of the interviewees were familiar with was the one they were using, their frame of reference was limited. Only four interviewees indicated that their accounting package had not met their needs (The packages were: Udenberg, CENTRAX, Crestland Control Systems,and Grossman and Associates Professional Accounting).

Table 6
Summary Information on Accounting Software Packages

Accounting Package	Computer Platform	Stand** Alone	Source Language	Cost
Off-the-Shelf				
Agris Sales Account. & Patronage	PN	Y	Basic	$10,500-$14,500
Avant's Feed Mfr. Account. Syst.	PN	Y	Data Flex	$13,500
Burke Co-op Account. Syst.	PN	Y	Basic	$8,000-$15,000
FARMS, PATRON, Red Wing	PN	Y	Basic	$6,350
Harvest States Co-op Data Bank	M	Y	COBOL	$20,000
Indiana Farm Bureau Co-op Acct.	M	N	RPG II	$18,000-$20,000
MCS Accounting Package	M	Y	COBOL	$15,000+
PDS Agri-Business System	PN	Y	EDL	$5,000-$20,000
RealWorld (MFC)	P	Y	COBOL	$3,000
Southware and TFC	PN	N	COBOL	$10,000
Udenberg	M	Y	RPG II	$25,000 and up
Off-the-Shelf/Modified				
Crestland Control Systems	M	Y	RPG II & III	$35,000
Farmland Data Systems	M	Y	COBOL	$6,000-$21,000
Grossman & Assoc. Profess. Acct.	PN	Y	COBOL	$12,000-$26,000
SRE Co-op Accounting System	PN	Y	DBase	$8,000-$12,500
Modified				
CENTRAX*	PF	N	n/a	n/a
Great Plains	P	Y	n/a	n/a
Matterhorn	M	Y	RPG II	$30,000
Real World	P	Y	COBOL	n/a

P-Micro Computer (i.e. PC)
N-Network of PCs or Workstations
PN-Either PC or PC Network
M-Mini Computer (IBM 36, AS400, etc.)
F-Mainframe
PF-Combination of Mainframe and Micro Computer
+Includes additional charge for service contract.
**Indicates whether or not all or portions of the package require that the local be on-line with a regional or send data to a regional for processing.

2. Operations Software

Twenty three cooperatives (16 local, 6 regional, and 1 "other") indicated that they utilized one or more operations-related software packages. Packages were used in the areas of least-cost feed rationing, fertilizer mixing and other activities related to sale of products by a local/regional cooperative to its members. Most of these packages were developed or modified by a regional for use by its locals. Almost all of the packages

identified operated off a microcomputer and were considered "off-the-shelf" products by their users. Appendix C contains information on the operation software packages identified in the survey. Appendix D provides information on operation packages identified in AGCITES.

E. Literature Review

The literature review yielded some additional information on computer software utilized by agricultural cooperatives in the United States. For the most part however, the citations were limited to announcements for computer software or "on-line" services that were designed to be used directly by farmers and not by agricultural cooperatives. Appendix F provides a list of Electronic Ag Information Services that appeared in the April 1989 issues of Ag Computing. Summary information on most of the software and "on-line" services identified via the literature review is contained in the AGCITES lists found in Appendix D.

Only two articles found through the literature review specifically discussed the use of computer software or "on-line" services by agricultural cooperatives. An article that appeared in the October, 1985 issue of BUYING For The Farm ("He Gets Benefits of Computer Feeding-Without the Cost") described a computerized ration balancing program offered by Ralston Purina and used by A-G Cooperative of Arcadia, Wisconsin. The program enables A-G Cooperative to provide accurate, computerized ration balancing based on a customers individual diary herd and feed supply. The service is offered at no charge to customers of A-G Cooperative.

An article that appeared in the December, 1989 issue of National Hog Farmer ("Computer Marketing: Will Producers Be More Receptive the Third Time Around?") described a computerized electronic auction system used by the Central Livestock Association at the South St. Paul Stockyards in South St. Paul, Minnesota and by the Equity Livestock Association in Wisconsin. The program called CHAMP II was developed at Ohio State University. The program is used to market hogs to packers and other buyers. Market agencies such as Equity Livestock enter hogs available for sale and a starting price into the computer and buyers who are on-line can bid on the set of hogs.

F. Comparison to Cooperatives In Target Countries

Compared to cooperatives in the five target countries, United States agricultural cooperatives utilize computers much more extensively. Every cooperative included in the survey of U.S. agricultural cooperatives indicated that they had at least one micro-computer, whereas many of the cooperatives in the five developing countries had no computers at all. For those developing country cooperatives that did have computers, the type of computer was usually limited to an IBM PC or PC clone. In the United States, on the other hand, the type of computer platform used by cooperatives ranged from non-networked microcomputers to large mainframes utilized by regional and marketing cooperatives.

Cooperatives in the United States were also more likely to utilize accounting and operations software. Accounting software tended to be fully integrated. In developing countries, software was mainly limited to basic word processing and spreadsheet software. Accounting software was either unavailable or not integrated. Software support was also more available among U.S. cooperatives than their developing country counterparts.

Access to software and hardware vendors, and quality of telephone lines in the United States also make it easier for U.S. agricultural cooperatives to acquire computer systems, update systems and acquire software and support. Even in rural areas, U.S. agricultural cooperatives are in a much better position than cooperatives in developing countries to fully utilize the benefits of computers.

V. CONCLUSIONS AND RECOMMENDATIONS

Of the 53 agricultural cooperatives that participated in the survey, all utilized a computer for some aspects of their operation. Computer usage varied between small and large cooperatives. Small cooperatives ($125,000 to $15 million in annual sales) tended to utilize PCs (microcomputers) or PC networks while large cooperatives ($50 million to over $2 billion in annual sales) utilized mainframes. Mid-size cooperatives ($15 million to $50 million in annual sales) tended to utilize minicomputers. U.S. cooperatives compared to cooperatives in the five developing countries, were much more computerized and were more likely to utilize computer-based information services and computer-based communications with remote locations (due in large part to the availability of the on-line services in the United States and the quality of the telephone service found in most parts of the United States).

United States agricultural cooperatives were also more likely to utilize fully-integrated accounting packages and specialized operations-related software packages than cooperatives in the five target countries. The survey identified 19 "brand name" accounting packages. In addition to the brand name packages, several customized packages developed in-house by larger cooperatives were also identified. Interviews with cooperative personnel also identified 14 operations-related software packages. A search of the AGCITES database provided a substantial number of operations-related software packages. Overall, the cooperatives surveyed tended to be satisfied with both their accounting and operation-related software packages.

Recommendation 1: Software Introduced Should Be Designed For PCs/PC Networks

Based on the data gathered from the interviews with U.S. cooperatives and the information contained in the feasibility studies for the five developing countries, it is recommended that any software packages ACDI introduces to cooperatives in developing countries be designed for PCs or PC networks. There are several reason for this recommendation:

1) All five of the feasibility studies indicated that microcomputers were the type of computer platform most available to the cooperatives in the developing countries. The feasibility study prepared on Indonesia , for example, specifically recommend that the IBM XT be the standard architecture for hardware used by cooperatives in that country.

2) Cooperatives in the five target countries would be more likely to find in-country support and service for PCs/PC network hardware and software than for hardware and software designed for other platforms.

3) Several fully-integrated accounting packages and over 100 operations-related software packages have already been developed for use by cooperatives with PCs/PC networks.

4) With advances in technology and design, PCs/PC networks will soon be comparable in memory storage capacity and speed to minicomputers utilized today. Some computer consultants suggest that minicomputers will soon become obsolete.

5) The cost of PCs/PC network software and hardware is usually less expensive than software and hardware designed for other platforms.

Recommendation 2: Computer Based Communication Not Practical for Most Developing Country Cooperatives

Many of the cooperatives surveyed utilized computer based communications either to communicate with remote locations, locals or regionals, or in accessing electronic bulletin boards, market information services or credit bureau information services. Although two of the regional cooperatives interviewed explored communicating to locals and remote locations via FM signals, telephone line transmission was the only form of computer-to-computer communication utilized by the cooperatives surveyed. With the exception of Cost Rica, given the limited and poor quality telephone systems in the developing countries, encouraging the utilization of computer-based communications at this time appears to be impractical. Unless further study is done on computer communication via radio frequencies, improvements in the telephone systems of the developing countries are needed before effective computer communications can occur.

Recommendation 3: Four Accounting Packages Should Be Examined In Further Detail

The feasibility studies indicated that the most pressing computer software need that cooperatives in the developing countries have is for an integrated accounting software package. Given this stated need, it is recommended that ACDI's Software and Systems Advisory Committee, with the help of a consultant, further evaluate a set of the accounting packages identified in this study. Based on interviews with cooperatives and software vendors/developers, of the 11 PCs/PC network accounting software packages identified, the most appropriate packages appear to be:

- SRE Co-op Accounting System
- Burke Cooperative Accounting System,
- FARMS, PATRON, Red Wing System,
- Agris Sales Accounting & Patronage System

These four packages should be examined in further detail by ACDI as possible accounting software packages to introduce to cooperatives in the five developing countries.

Although most of the other PCs/PC network platform accounting software were viewed favorably by their users, these four packages appear to be the best suited for smaller cooperatives. The Burke and SRE Co-op Accounting systems were described as good, solid, easy-to-use accounting packages. The developers of both packages are willing to modify the package to best suit the needs of the user. In addition, both packages come with source code allowing for modification in-house. The FARMS, PATRON Red Wing System and the Agris Sales Accounting System were also cited for the ease of use. According to a vendor, a language translator has been developed for the Agris Sales Accounting System which allows for conversion of the package to a language other than English.

In evaluating these four packages the following steps should be taken:

1) Acquire demonstration copies of the software;

2) Visit cooperatives utilizing the software to view the software operating under actual business conditions;

3) Meet with developers/vendors to explore the possibility of modifying the software for ACDI's use, to explore marketing agreements, to determine the availability of language translators and to determine the degree to which the developers/vendors are willing to provide ongoing support.

4) Test the software package(s) receiving a positive evaluation after step 3 among a sample of cooperatives in developing countries.

5) Recommend those packages tested positively in step 4 four wider use among cooperatives in developing countries.

Recommendation 4: Further Study Needed Before Recommendations Can Be Made On Operations-Related Software

Information on several operations-related software packages utilized by U.S.. agricultural cooperatives was gathered from the survey and from other sources. However since the the feasibility studies prepared for the five developing countries were not clear on the types of operations-related software that would be of most use to cooperatives in those countries it is not practical to recommend specific operations-related software packages. Instead it is recommended that "types" of operations-related software packages be explored to determine their relevancy to cooperatives in developing countries. The types of software packages recommended are: feed rationing; fertilizer mixing; fruit,vegetable and nut production; fruit, vegetable, nut and grain storage; and fish catching and processing. In selecting software packages from these groups, the following approach should be taken:

1) Interviews be conducted with the consultants that prepared the feasibility studies and directly with cooperatives included in the feasibility studies to determine if these types of operations-related software are needed;

2) From the lists of operations software contained in Appendix C and Appendix D, a sample of packages should be selected based on the stated needs of the cooperatives in the developing countries.

3) The packages selected should be examined in detail following steps outlined under recommendation 2. → 3

Recommendation 5: Software User Groups Should Be Established

Once ACDI has determined which accounting and operations-related software packages to introduce to cooperatives in developing countries, user groups (both international and intra-country) should be established for each software package. User groups could be effective vehicles for cooperatives to share their experiences with the software. User groups could also be helpful in providing training and update information on the software packages.

Conclusion

This report contains a wealth of information about computer utilization by agricultural cooperatives in the United States. It also contains useful information on a variety of software packages used by U.S. agricultural cooperatives. This information can be of value to ACDI in its efforts to enhance the operations of cooperatives in developing countries in its present form. However, to fully utilize the information contained herein, the collection of additional data on the specific software needs of cooperatives in developing countries is necessary.

APPENDIX A

SURVEY OF COMPUTER SOFTWARE USED BY U.S. AGRICULTURAL COOPERATIVES

Name of Co-op: _____

Address: _____
_____
_____

Contact: _____

Phone: _____

Date: _____

1. Type of Co-op: _____

2. Co-op's Activities:

3. Regional (Secondary) or Local (Primary) Co-op?

4. Size of Co-op:

   a. Annual Sales? (in dollars) _____

   b. Asset Size? (in dollars) _____

   c. Number of Members? _____

   d. Number of Employees? _____

5. Age of Co-op: _____

6. Year in which first computer installed: _____

7. Please Describe your Computer System:

8. Is the system a multi-user system? ___

   If yes, how many terminals/workstations does it have?

9. Do you have an in-house computer programmer? ___

10. What was the overall cost of your computer system:_____

11. What (if any) management/accounting software do you use?

12. What (if any) operations software (feed mixing, fertilizer mixing, breeding, crop rotation) do you use?

13. Do you use an internal e-mail office management system?

    If yes please describe.

14. Do you use an external e-mail or other computer based communications?

    If yes, with whom do you communicate (via computer based communications)?

    What is your monthly expense?

15. What is your monthly expense for FAX? Telex/Cable?
    (note, instead of expense you could ask for traffic)

16. If local (primary), are you on line with a regional (secondary) co-op?

    If yes, how are you connected? (Public Data Network? Direct Dial-up? Dedicated line/satelite system?)

    If yes, for what software program(s) are you on-line with a regional (secondary) co-op?

17. Do you utilize any public or private databases?

    If yes, please describe.

18. Are there databases you would like to access but currently do not?

19. What data would you like to have in an accessible database that is currently not available?

20. Do you subscribe to any trade contact or cooperative communication/information networks?

If yes please describe.

What is your monthly expense?

21. What (if any) computer based training (CBT) software do you use?

22. Would you like ACDI t o send you a copy of our report when it is completed?

A COPY OF THIS FORM WILL BE FILLED OUT FOR EACH TYPE OF COMPUTER SOFTWARE USED

Type of Software Package _____
(e.g. accounting, database, operations, communications)

1. Name of Software Package: _____
2. Version of the Package: _____
3. When did you purchase the package: _____

4. Name of the software developer: _____

5. Name of the vendor from whom you purchased the software: _____

6. How much did the software package cost? _____

7. How would you describe the software package (Choose one):

   ____ Off the Shelf
   ____ Modified
   ____ Customized

8. In what language is the software written (source language)?

9. If applicable, please list the modules available with the package (i.e. for an accounting package modules may include: general ledger, accounts payable, patronage, etc.):

10. If applicable, please list the modules that you utilize:

11. Please describe the hardware (type of computer, memory capacity, disk capacity, etc.) on which the software is used.

12. What operating system drives the hardware on which you use the software?

13. Can more than one operator access the software at one time? _____

    If yes, how many operators can access the software at one time? ___

14. Was a source code book provided with the software? _____

15. Can you modify the software package in-house?_____

16. How easy is it to modify the software?

Very Easy	1	2	3	4	5	Very Difficult

17. How easy/difficult was it to learn to use the software?

Very Easy to Learn	1	2	3	4	5	Very Difficult to Learn

18. How easy/difficult is the software to operate?

Very Easy to Operate	1	2	3	4	5	Very Difficult to Operate

19. How helpful have you found the software's user's manual?

Very Helpful	1	2	3	4	5	Not at All Helpful

20. What degree of support from the vendor/developer have you needed to operate the software?

Very Little Support Needed	1	2	3	4	5	Very Much Support Needed

21. If you were required to go to the vendor/developer for support, how available were they?

Very Available	1	2	3	4	5	Not at all Available

22. To what extent has the software met your needs?

Completely Met Needs	1	2	3	4	5	Not at all Met Needs

23. Have you had any problems with the software?

If yes, please describe.

24. Please describe the strengths of the software.

25. Please describe the weaknesses of the software?

26. If developed in-house, would you be willing to donate or sell a copy of the software to a nonprofit like ACDI for use by cooperatives in developing countries?

27. Please provide any other comments about the program:

28. Are you aware of any other software packages that perform the same function?
If yes, please name.

29. Why did you choose the package you are now using over the other packages you named?

APPENDIX B

Agmax, Inc.
111 South Jackson
Frankfurt , IN 46041

Type of Co-op: Local (Farm Supply) *Affiliation:* Independent
Contact 1: Steve Dunlop (317) 659-3334
Contact 2:
Contact 3:
Agreed to Participate? yes

Agriland Cooperative
P.O. Box 468
Fond du Lac , WI 54936

Type of Co-op: Local (Farm Supply) *Affiliation:* Farmland
Contact 1: Harris Kotter (414) 922-3220
Contact 2:
Contact 3:
Agreed to Participate? yes

Agway, Inc.
P.O. Box 4933
Syracuse , NY 13221-49

Type of Co-op: Regional (Centralized) *Affiliation:*
Contact 1: Dick McCarthy (315) 449-7860
Contact 2:
Contact 3:
Agreed to Participate? yes

Akron Agway

Akron NY

Type of Co-op: Local *Affiliation:* Agway
Contact 1: Greg Brown (716) 542-2781
Contact 2:
Contact 3:
Agreed to Participate? no

APPENDIX C

Package Name: **Agris Sales Accounting and Patronage**

Type of Software: Accounting off-the-shelf

Platform: Micro PC/PS2/PC Network *Multi-user?* yes

Source Language: Basic *Source Code Provided?* no *Modify In-house?* no

Requires On-Line to Regional? no *Cost:* $10,500-$14,500

Special Features: Have a language translator for $10,000

Other Information: Agris system is used by Farmland in their ANSER System

Developer: Agris Corporation *Vendor:* Beacon Systems Corporation

Contact: John Schmidt (612) 933-5580
Beacon Systems Corporat
8700 W. 36th Street, St
Minneapolis, MN 55426

Cooperatives Surveyed That Are Using Package:

Valdosta Feed Mill

Package Name: **Avant's Feed Manufacturers Accounting System**

Type of Software: Accounting off-the-shelf

Platform: Micro PC/PC Network *Multi-user?* yes

Source Language: Data Flex *Source Code Provided?* no *Modify In-house?* no

Requires On-Line to Regional? no *Cost:* $13,500

Special Features:

Other Information:

Developer: Avant Computer Associates, Inc. *Vendor:* Avant Computer Associates, Inc.

Contact: Bill Gilmer (404) 977-7255
Avant Computer Associates, In
102 Powers Ferry Road
Marietta, GA 30067

Cooperatives Surveyed That Are Using Package:

Poultreymen's Cooperative

APPENDIX D

MARKET CHARTING SOFTWARE PROGRAMS

Program Name:	**Advanced Chartist**
Company Name:	The Pardo Corp. 1800 Sherman, # 609 Evanston, IL 60201 (312)-866-9342
Retail Price:	$495
Machine Type(s):	IBM Other

Description:
The advanced Chartist is an easy-to-use yet sophisticated charting package for stock, options and future traders. Chart daily, weekly or user defined data. Features: spreads, multiple screened, multiple histories on the same screen, comprehensive price scaling, point and figure, swing charts, filtered swing charts, equivolume charting, a note-pad subsystem, a slide show subsystem, plotter compatibility and an artificial intelligence based evaluation of trend conditions. LIMITS: IBM: 256K(min), 2 disks or hd & color graphics monitor. DOS 2.0 - Pr. IBM/Epson

Program Name:	**CHARTPAC**
Company Name:	Micro Futures
Retail Price:	$100.00
Machine Type(s):	TRS80

Description:
Provides four types of commodity charts: Bar chart, ratio chart, point & figure, and spreads. A data list program is also included. User can choose scale or let the computer generate scale. Runs on video or line printer. All programs are run from a "menu." LIMITS: TRS 80, 48K, 64K, 2-Disk, 80 column printer

Program Name:	**COMMODITIES CHARTING**
Company Name:	H.C.I. 555 Third Ave. NW Hutchinson, MN 55350 (612) 587-2940
Retail Price:	$295
Machine Type(s):	APPLE

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APPENDIX F

Electronic Ag Information Services

System Name	Sponsor	Primary Users	Type of Services
ACRES Contact: Jim Simmons American Agric. Communications Sys. 225 Touhy, Park Ridge, IL 60068 (312)399-5870 or (800)828-8145	American Farm Bureau Fed.	Members of 36 participating state farm bureaus	Info. retrieval, market data analysis and AgriVisor trading advice, weather, legislative developments, all USDA market svc. reports.
agLine Contact: Steve Burhoe Doane Information Services 11701 Borman Drive, Suite 100 St. Louis, MO 63146 (314)569-2700	Doane Information Services	Agricultural Computing newsletter subscribers	Electronic mail, ag software reviews, public domain ag software, cash, futures, & options prices, market advice and analysis, major USDA reports Washington reports.
Agribusiness U.S.A. Contact: Jodi Doyle Pioneer Hybrid Data Base Mgt. 5606 Merle Hay Rd. Johnston, IA 50131 (800)338-5878	Pioneer Hi-Bred International, Inc.	Agribusiness	Indexes & abstracts from more than 300 business & gov't. publications, complete from Jan '85 to present. Full text of USDA statistical reports since Jan. '86 Updated every week.
AGRICOLA Contact: Gary McCone National Agricultural Library 10301 Baltimore Blvd. Beltsville, MD 20705 (301)344-3813	USDA/NAL	Farmers, agricultural and life science researchers nationwide	Info. retrieval (primarily agricultural research info.), extension publications.
AgriData Network Contact: Beth Koehler 330 E. Kilbourn, Milwaukee, WI 53202 (800)558-9044; WI, (800)242-6001	AgriData Resources, Inc.	Nationwide	Business decision info.; education svc., Ag Ed Network, market advisories, cash & futures prices, gov't. & commod. news
ANSER Contact: Dr. Robert Fehr Ag Data Center — Univ. of Kentucky Lexington, KY 40546-0092 (606)257-7207	U. of Kentucky	Farmers and 90 extension offices in Kentucky	Problem solving for farm mgt. info. retrieval.
AQS II Contact: Steve Reyhle Commodity News Services, Inc. P.O. Box 6053 Leawood, KS 66206 (800)255-6490 or (913)642-7373	Commodity News Services	Nationwide	Grain, livestock, and cotton futures and cash prices, weather and financial information.
ATI-Net Contact: Jeff Ennen Calif. Agricultural Technology Institute Fresno, CA 93740-0079 (209)294-2361	CATI	California farmers and nationwide	Info. on Calif. agriculture, bulletin boards, electronic mail teleconferencing, free communications software.
DRAGNET Delaware Dept. of Agriculture 2320 South DuPont Hwy Dover, DE 19901 (302)736-4811	Delaware Dept. of Ag in cooperation with the Extension	Delaware ag professionals	Bulletin board, public domain farm mgt. & agronomics software for downloading.
DTN Contact: DTN, Inc. 8905 Indian Hills Drive Omaha, Nebraska 68114 (800)345-8554	Data Transmission Network Corporation	Farmers and ranchers, agribusinesses	Futures & option quotations from all major commodity exchanges; cash livestock prices add-on market advisories.
EXNET Contact: Deborah Coates 106 Computation Center Iowa State Univ., Ames, IA 50011	Iowa State University Extension Service	Iowa extension services and farmers	Integrated pest management extension and home economics info., weather reports electronic mail, USDA markets
FACTS Contact: Bill Simmons Ag Computer Network 105 Smith Hall, Purdue University W. Lafayette, IN 47907 (317)494-8333	Purdue University	Indiana farmers and extension offices	Ag data bases for Indiana, decision aid programs, problem solving programs, info. retrieval

System Name	Sponsor	Primary Users	Type of Services
Global Link/Instant Update Contact: Professional Farmers of America 219 Parkade Cedar Falls, Iowa 50613 (800)553-2910 ext. 100; Iowa, (800)772-2106	Professional Farmers of America	Nationwide	Pro Farmer reports & opinion; news & news features; price quotes; price charts; technical comments & indicators; Washington reports; & floor comments
INFOTEXT Instructional Communications Systems University of Wisconsin—Extension 975 Observatory Dr. Madison, WI 53706 (608)263-4262	University of Wisconsin—Extension	Farmers and extension offices	Weather; markets; news; UW—extension specialist reports.
Instant Update Contact: Instant Update 219 Parkade, Cedar Falls, IA 50613 (800)553-2910; Iowa, (800)772-2106	Professional Farmers of America, Inc.	Nationwide	Info. retrieval, commodity prices, market advice and analysis, options, weather, news wire.
National Weather Service Contact: Joanna Dionne, W/NMC53 Climate Analysis Center World Weather Bldg., Room 811 Washington, DC 20233 (301)763-4670	National Weather Service	Nationwide agricultural and energy applications and hydrology	Temperature and precipitation data, various weather reports, textual forecast.
NPIRS Contact: User Services, NPIRS Entomology Hall, Purdue University West Lafayette, IN 47907 (317)494-6614	Purdue University	Nationwide, plus 11 international users	Federal & state pesticide registrations, related chemical info., all hazardous chemicals, MSDS (Material Safety Data Sheets), EPA's PDMS (Pesticide Documentation Mgt. System).
PIONEER® Information Network Contact: Mark Lyle Pioneer Hi-Bred International, Inc. 11153 Aurora Avenue, BIS Des Moines, Iowa 50322 (800)338-5873	Pioneer Hi-Bred International, Inc.	Nationwide producers, agribusinesses	Ag commentaries, agronomic updates, commodity chart download, Pioneer product info., market info., & daily cash grain prices, domestic & international weather.
RFD TV 2615 Farnam Street Omaha, NE 68131 (402)345-2322	RFD-TV	Satellite dish owners	Ag news; weather, livestock, money, metals, fruits & vegetables, & grain markets; options; stock market update.
SCAMP Contact: Jim Tete IPM Program NYS Agricultural Experiment Station Geneva, NY 14456 (315)787-2208	Cornell University	New York extension offices, New York state agencies, coop. institutions, and farmers nationwide.	Info. retrieval, pest forecasting, weather forecasting, pest/crop/weather reporting, elec. mail. Macintosh & IBM bulletin boards.
The Source Contact: Source Telecomputing Communications & Marketing P.O. Box 1305, McLean, VA 22102 (800)336-3366	Source Telecomputing Corp.	Nationwide & international	Info. retrieval, commodity prices, USDA reports, electronic mail, news, business, & investing, travel, education, shopping, games.
TELCOT Contact: Plains Cotton Coop Association P.O. Box 2827, Lubbock, TX 79408 (806)763-8011; (800)858-4532 in states adjoining TX; (800)692-4459 in Texas	Plains Cotton Coop Association	Cotton gins and buyers	Electronic trading of cotton.
UMC BBS Contact: John Travice 325 Mumford Hall Univ. of Missouri Columbia, MO 65211 (314)882-4827	Univ. of Missouri—Columbia	Missouri and midwestern ag professionals	Utility programs, spreadsheets, daily & weekly info from Univ. Ag Dept., info from Soil Conservation Svc., USDA, Integrated Pest Mgt.; daily Missouri agriweather forecast, more.
USDA EDI Service Contact: Russell Forte Room 536-A, Office of Information U.S. Dept. of Agriculture Washington, D.C. 20250 (202)447-5505	USDA	Distributors of information to farmers & ranchers	Same as USDA On-Line, but faster, & more reports offered. Soil Conservation Service info. Coop state research service.
World System Teletext Contact: Tempo Enterprises 3530 Bomar Road Douglasville, GA 30135 (404)949-6600	Tempo Text	Nationwide	News; latest sports information; late weather data and forecasts; theater information; traffic information & travel data; stock and commodity reports. □

Appendix D

Philippines Radio Packet Switching Technical Implementation and Business Applications Report

Philippines Radio Packet Switching Technical Implementation and Business Applications Report

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December 1991

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I. Introduction

As compared with many other parts of the country, cooperative development in Mindanao has proceeded at an accelerating rate in recent years. A recent (December 1991) decision to federate eleven existing cooperative banks in Mindanao into a region-wide cooperative bank is an important step in the process of facilitating, through enhanced banking services, continued growth of cooperative business enterprise within the region.

IAP/ACDI project assistance aimed at building functional communication interlinkages between banks and primary cooperative businesses through the introduction of a voice/data communication network addresses a critical development need. Voice/data communication if essential to business competitiveness and continued growth opportunity for the cooperative sector in Mindanao, and elsewhere. The following report presents broad guidelines, strategies and an action plan for developing business applications for communication hardware now being installed under a joint agreement between Agricultural Cooperative Development International (ACDI) and the Philippine Federation of Cooperative Rural Banks (PCRBF).

A. Envisioned Business Applications

1. Banking Applications

With the establishment of a regional-level cooperative development bank serving as many as thirteen provinces with separate branch offices in each location, on-line computer capability will be a requisite to efficient daily banking activity. A standardized management information and reporting system will need to be developed which serves the routine business functions of a regional banking network. This not only includes the necessity developing a communication network with computerized functions for saving and loan accounts, general ledger activity, cost accounting, payroll, etc., but it also extends to such areas as fund transfer, financial clearing and interlending. Standardized software programs designed for financial institution application are available but will need to be customized to serve the particular needs of the cooperative bank(s) in Mindanao.

2. Cooperative Marketing Information System

The voice/data communication network has the hardware capacity to collect and disseminate critical data and information necessary to assuring cooperative enterprise a competitive position in the marketplace. This includes inter-cooperative trade and trade between cooperatives and non-cooperative businesses. Commodity demand and supply data and

wholesale ad retail price information is particularly important for agricultural commodities produced, processed and marketed by cooperatives, as the agriculture sector continues to dominate a substantial volume of cooperative business activity within the region. Increasingly, however, cooperatives will engage in the production and consumption of nonagricultural commodities and durable goods and an efficient market information system must have the flexibility of expanding its range of services.

A voice/data communication network makes possible the establishment of functional market linkages between production centers and urban market centers and will contribute substantially to enhanced cooperative marketplace competitiveness, both in terms of vertical as well as horizontal linkages, as communication link farmer cops with coop processors, coop market vendors, consumer coops and credit coops.

The presence of a market information system will contribute to business efficiency by reducing response time and allowing cooperatives to market goods in appropriate bulk volumes thereby ensuring competitiveness, optimizing cash flow and reducing costs associated with storage and transport.

3. Information Exchange and Communication Applications

Additional business applications offered by the presence of a voice/data communication network extend to such areas as technology transfer, problem solving, data transmission, oral and written communication, personnel supervision, program management, education and training, and emergency information transmission. Such applications also facilitate enhanced cooperation and understanding between user groups, thus contributing to stronger business and institutional relationships.

B. Stages is Communication Network Development

For all intents and purposes, the development of an operational voice/data communication network may be divided into three distinct part, or phases. These include: (1) equipment hardware installation and testing; (2) business application software design, installation and testing; and (3) personnel recruitment, training and performance evaluation. To some extent, these phases overlap one another as equipment, programs and people interact in a dynamic process of testing, learning, refinement, application and expansion. For purposes of discussion each area will be examined in greater detail.

1. Equipment Hardware Installation and Testing

This phase of system development is currently underway. Initially two-three communication terminals will be set up including one repeater for transmissions between Davao City and Southern Mindanao. Expansion of the system will be time-phased to include a second repeater and additional terminals in all bank branches within the region. Additional

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communication terminals will eventually serve major cooperative business groups representing agricultural, consumer, health and housing sectors. Capital investment costs for equipment currently preclude a rapid network expansion. During the interim years, terminals will most probably coincide with the location of branch coop banks in Mindanao. The PCRBF in Davao City has been selected as the communication command center for the system.

At this stage of system development it would appear to be a wise decision to limit the total number of operating terminals. Business applications are yet to be designed and much work remains before even a limited scale communication system is functional. Additionally, the first step will be to test the equipment in terms of its operational efficiency with respect to designated initial terminal and repeater locations.

2. Business Application Software Design, Installation and Testing

Even with a limited functioning hardware network in place, it will be possible to proceed with virtually all aspects of business application software design, installation and testing, These activities will, however, have to be time-phased as certain business applications should take precedence over less strategic communication needs. It is recommended that initial applications be restricted to requisite banking transactions, earlier defined, of the newly created regional cooperative bank and certain cooperative market information data gathering and dissemination. Initial market information should be limited to major commodity demand, supply and price information surrounding critical agricultural activities presently representing bank financing and cooperative trade activity. Organized systems and procedures for handling information exchange and communication are less important at the initial stage of network operation, however, design of such systems and procedures can proceed once priority applications are addressed.

Specialized technical expertise will be required to design install, test and refine each application, and to supplement initial human resource development needs. Depending on the level of detail ad sophistication in the specific application, 6-18 months of expertise may be required for each application. It is possible to find combined expertise in a given individual's background in some instances, however, more often than not a person capable of designing software (or tailoring standardized software to a particular institutional users needs) and training communication system operators may not have a background diverse enough to exhibit competence in several specialized fields such as banking and financial transactions, market information systems, management information and reporting systems, and multi-user communication networks.

While technical assistance in application systems design and development can be time-phased, sufficient care should be taken to insure that sufficient time is allocated in each stage to insure that strategic levels of accomplishment are attained. Trainor training is an integral element of this process, as senior staff personnel will be required to continue work between periods of intermittent technical consultations.

3. Personnel Recruitment, Training and Performance Evaluation

Over time, a significant human resource development program will be required to meet the diverse needs of a decentralized and integrated communication network. This will not only include terminal operators but will extend to those responsible for gathering basic information and reporting the same on standardized data/information formats. At the command center of the communication network, it is strongly recommended that an MIS unit be created capable of supporting integrated computer applications. In addition to the varied responsibilities associated with MIS, market information gathering and dissemination, financial and banking applications, this group will in time assume training responsibilities for new personnel at all levels joining the cooperative communication network. During the first year following system installation (1992) a core staff of not less than three persons should be assigned to work with the new MIS unit. In time the staff capacity of this unit should be increased to support expanded communication network business applications, including software and hardware equipment maintenance and growth of computer systems and applications.

Beginning concurrently with the Equipment Hardware Installation and Testing phase existing designated communication network personnel should be given additional training in computer science, including D-base, Lotus, and word processing. Sufficient private sector computer training capacity exists in Davao City to support such training and additional computer skills will be prerequisite to most business applications requiring data transmission in the new communication network.

C. Specific Recommendations

1. Project proponents and sponsors should explore new funding mechanisms to provide the necessary financial support for specialized technical assistance to augment the process of application systems software design, installation, testing, refinement and training, particularly in the areas of banking/financial applications, MIS and market information. A working budget of $25,000 should be sufficient to ensure sustained expatriate technical support for a period of 2-3 months. Alternative arrangements include technical assistance sponsorship under VOCA or the FAO-supported regional microbanker project. Candidates for work to be performed include: Dr. Kenneth Smith, former USAID MIS specialist with advanced computer software design capability, MIS and market information system development experience; and Walter Bohon, former MIS computer specialist for USAID/Jordan, with broad software design, installation and human resource training expertise, particularly in MIS and banking/financial applications. Both individuals are presently available for engagement. Their respective contact addresses and biodata may be sourced from Pacific Agriservices, Inc. at fax number 1-509-299-4787.

2. Certain business applications for use in the voice/data communication network should be developed using a cost-recovery formula so that institutional users pay a fee, perhaps on

an annual basis, for use of services and data generated. Banking/financial applications will be an internal function of the regional cooperative bank and, as such, would probably be an inappropriate candidate for a cost-recovery scheme. However, certain market information generated and distributed through the communication network should be made available to cooperative users on a fee basis. Additionally, cooperative users wishing to source information, data, technology, technical assistance, or use the system for transmitting information and communications should be required to pay a user fee for such services. In this way, long-term O&M costs of the communication network can be developed on a self-sustaining basis.

3. In addition to immediate training needs, as mentioned in earlier sections of this report, a long-term training program should be defined for addressing the human resource development needs of those responsible for generating information and transmitting the same through the communication network, based upon the various business applications to be developed. Time permitting, one of the tasks assigned to specialized technical specialists could be to develop a tutorial software package for self-study for newly recruited employees who will work with various aspects of the communication network. In lieu of this, trainor training should be conducted for senior staff members at the communication center to equip those individuals with the basic skills necessary to train others as the system expands.

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Appendix E

Agricultural Marketing and Trade Information Resources in Hungary

AGRICULTURAL MARKETING AND TRADE INFORMATION RESOURCES IN HUNGARY

U.S. AID REPORT

BY

AGRICULTURAL COOPERATIVE DEVELOPMENT INTERNATIONAL

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AGRICULTURAL MARKETING AND TRADE INFORMATION
RESOURCES IN HUNGARY

I. Background

A. Hungarian Agriculture

Hungarian agriculture is the most advanced and successful of the Eastern bloc countries. Modern farming technology, and production at near capacity have led to sizable exports for Hungarian agricultural products. Many of those products were exported to COMECON countries, especially the Soviet Union. Since the recent problems experienced in many of the COMECON countries, exports have fallen dramatically.

Prior to democratization, agriculture was a vertically integrated system with agricultural research, input supply, production, processing, marketing and export coordinated and largely owned by the state.

With a total land area of 9.3 million hectares, of which approximately 70% is arable and some further 18% is suitable for forestry production, Hungary is well placed to feed both its population of 10.2 million residents and to export surplus commodities. In total, the agricultural sector employs some 4.5 million people with one in five of the total population fully employed in agriculture. Structurally, the agricultural sector is broken down into four components.

- state farms
- cooperative farms
- privately owned farms
- part-time backyard farmers

There are currently 135 state farms characterized by their extremely large size, averaging 8,000 hectares (U.S. 19,760 acres). They control a major portion of the arable land. These farms are primarily involved in large-scale cereal production, but also in livestock including dairy, poultry, beef and pork. These state farms have had little difficulty obtaining access to required inputs needed for their operations.

Officially, there are 1,247 cooperative farms in Hungary, also farming a large portion of the arable land. In addition to farming communally, members are usually given 0.5 hectares for their personal use.

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Full-time privately owned farms, ranging from 10-40 hectares, are emerging in Hungary. While still small in numbers, the privatization of the agricultural sector has caused an increase in private farm ownership.

Part-time farming is practiced by a large segment of the population, some 1.5 million persons. While many people have moved into urban jobs, many still farm on a part-time basis, largely for economic reasons.

One of the important issues arising in the agriculture sector is that of land ownership. Collectives and state-run farms control a large part of the arable land in Hungary. As part of the democratization process, the Hungarian government put forward a compensation law which establishes a process for former owners to recover their own lands or receive ownership shares in privatizing companies or state securities. The government has estimated that private ownership of land will increase to 70-80% of arable farmland in the near future.

B. Objectives

In November 1991 ACDI completed a review of the agricultural sector which identified needs for improving the marketing efficiency of the Hungarian agricultural industry. Within that review, ACDI identified a critical lack of market information available for use by marketing managers. Quoting from the ACDI report:

> "Because of the lack of market information currently available in Hungary, it is difficult to provide a detailed list of each item, quality/quantity of processed food products, specific potential markets for each item, estimated market value, etc. It is felt the information exists, but it is held in a variety of locations and our impression was that is not used by decision makers."

No database of information about products which Hungary produces and has available for sale could be identified.

The objective of this project is to assess the market information system currently being used in Hungary and to make recommendations for change, which may lead to improvements in marketing Hungarian agricultural products. Many issues fall within the scope of this project.

First, the information currently collected and distributed must be assessed for the value it does or may provide to Hungarian producers. Second, information which is collected and not currently made available to producers and marketers must be assessed for its potential value for improving the decision making of producers and marketers. Third, the system used for distributing this information must be reviewed to determine the accessibility of the information and whether more cost effective means exist for distributing the information.

II. Status of Current System

A. Current Information Systems Used in Marketing Hungarian Agricultural Products

1. General Discussion

The different types of farms in Hungary have led to different requirements for market information. Requirements for large state-owned farms differ from those of cooperative farms because of the sophistication of the managers and types of products which are important in their operations. State-owned farms have been large producers of cereal grains in Hungary. Grain has historically been marketed through various milling operations for feed and the excess was purchased by the 'Grain Trust' at a minimum fixed price as required by the government. The Grain Trust was a state-owned monopoly which has since been abolished in the development of a free market economy and has left farmers searching for new ways of marketing their excess crops. Agrimpex was the government monopoly which marketed most of the grain in the former Soviet Union.

Agrimpex has since been privatized and now operates as a joint-stock company. It still exists as a marketing outlet for the majority of excess crops but does not share the information structure it operated with for the last several years. State and cooperative farms have thus been left to their own means for developing a new market information system. The Budapest Commodity Exchange has been one of the few developments that have helped in this process of establishing a market information network.

Livestock farmers have been affected by the change in economic systems much like the grain farmers have. Loss of established marketing channels and markets has left a void of market information for many. Terimpex was the state-owned monopoly for marketing meats and cheese. While it has been privatized, it has not shared the information it acquires in the markets it serves. The Budapest Commodity Exchange has helped in filling this need.

Produce farmers also need an information system for efficient marketing of produce within Hungary, as well as for export. STAGEK is a market information network which has been developed by the Ministry of Agriculture with the assistance of the EC-PHAR group. This system collects and disseminates produce information needed in the domestic market. A rival system being managed by Zoedker, a private firm, also assists in the domestic produce markets.

The recent changes in political structure have led to hardship in Hungary because of the loss of export markets, and the country has difficulty in identifying new markets. The development of a free market economy and the privatization of state-owned marketing companies has led to an increase in companies involved in international trade for agricultural products from about 100 to over 1,200 firms. Another example of this trend is the fruit and vegetable industry. Hungarofrucht was the state-owned monopoly for marketing excess fruits

and vegetables. That function is now being performed by several firms. Market information has become an important function in the export of fruits and vegetables.

The growing importance of international trade has inspired the development of other sources of information. Kopint-Datorg is another project that assists in international trade of all agricultural products by collecting data from customs clearance forms. It is developing a data base of agricultural products being traded in the international market. In addition to this project, it also collects information from the German wholesale market for distribution to international traders. The organization also gathers information from other international sources that could assist in international trade.

In addition to the market information providers, several firms have been developed to assist in matching firms in trade. Several sources manage offer/demand programs which give producers and buyers opportunities to advertise their products or needs to others. Some of these programs are being managed as simple advertising programs (e.g., the offer/demand program of STAGEK) while others are sophisticated to the level of matching companies (e.g., Company Line Hungary).

Many ag marketing and trade information systems are currently available within Hungary. The following analysis first considers primary sources of data in terms of the information content and dissemination mechanism. Then networks which focus on further dissemination of information collected from the primary sources are described. An evaluation of further needs is then presented.

2. Market Information Data Sources

Budapest Commodity Exchange. Within Hungary, the Budapest Commodity Exchange has been developed for the purpose of marketing spot and futures contracts for livestock and grain. While lacking the sophistication of the commodity exchanges in the Western commodity markets (e.g., Chicago Board of Trade and Chicago Mercantile Exchange), these markets have continued to grow through time and expand in the number of contracts traded. The Budapest Commodities Exchange is organized to trade livestock commodities on Tuesday mornings and grains on Wednesday mornings. One pit exists for all commodities being traded in one session. Confusion among traders and on the floor is not unusual, given the large variety of products traded (especially considering the number of commodities and trading months in one pit.) After each trading session, the exchange publishes a summary report for that day and disseminates that information by fax and mail. The exchange is not currently configured to provide computer access to the summary information or to the activities during the trading period. The published information from the Exchange is captured by several agricultural news sources and published in many other outlets, including print, television and computer media.

The Exchange is currently considering means of reorganizing which may lead to less confusion during the trading and to more efficient means of disseminating their trading reports. Currently, information from the Exchange plays an important role in establishing prices for grain and livestock in Hungary. It is expected that this role will become more important as the Exchange grows.

Because the Exchange is not dynamic, since the trading session only takes place once a week, the importance of this data is diminished. However, prices established on the Exchange are important in fixing prices within Hungary. Additional trading in contract volume on the Exchange and extended sessions will cause this information to become more important to the livestock and grain markets in Hungary. The information from this Exchange could be improved, if it were augmented with information, available by computer, from the commodity markets in Chicago, which trade Monday through Friday.

STAGEK Market Information System. Stagek is a department within the Ministry of Agriculture which has the obligation to collect and disseminate market information from 15 wholesale and consumer markets in Hungary. They hope to expand their coverage of markets to 30 when an upgrade of the reporting system is completed. Prices and volumes of product brought to the market are collected daily by market reporters. Volumes represent those that are reported by the traders as available in the market that day. Prices represent those being reported by the traders as offer prices.

STAGEK augments its information with that from other sources which it feels would be of interest to its users. STAGEK includes reports from the Budapest Commodities Exchange and hopes to include information from the International Trade Center for prices of produce items in the European market.

Many criticisms have been voiced of the data collected by STAGEK. Volume data represent the volume available for sale that day, and consequently, involve multiple counting of some products not sold within a day's time. Prices reflect those that are being asked by the traders on the market and do not necessarily represent trading prices. Many products are sold at prices discounted from the posted price on the market.

Other individuals have criticized the data because it is collected by market employees, and as such, training is inadequate and quality of the data is variable. One company, Zoedker, has developed its own market reporting function on the Budapest wholesale market, a direct duplication of the STAGEK market reporting in Budapest, simply because it does not trust the data being reported by STAGEK.

The STAGEK system is currently being redesigned by the EC-PHAR Market Information System Project into a format that will increase the efficiency for reporting information into and from the network. It will also improve some of the reliability of the data since it will replace some of the data processing functions currently being performed at the markets by the market reporters with computer processing at the central headquarters. The system will

still be vulnerable to the criticisms of the data collected since it will not change the types of data collected. Long-term goals of the project are to improve the data by including quality observations about the produce which is being reported.

Zoldseg-Gyumolcs (Zoedker) Market News. Zoedker collects wholesale market news for fruits and vegetables at the Budapest wholesale market. It duplicates the news collected by STAGEK. Zoedker is a cooperative trading company for 13 fruit and vegetable companies in Hungary. Zoedker rents storage for produce at the wholesale market and attempts to find buyers for their members in the domestic market. Information is another asset they find of value in supplying to their members. Zoedker uses their own employees to walk the market and to measure the prices of and volume of products being traded. They associate quality with the prices they observe and evaluate the market for trends and other factors which could impact the market in the near future. They also use information from other sources which includes to include a market information newsletter they publish. They publish a market information newsletter which includes information from other sources such as the Budapest Commodity Exchange and the Hungarian Newsletter (Green Paper).

Wholesale market information is collected on Monday afternoon and again on Tuesday morning and then distributed by fax or telex Tuesday afternoon. It is again collected Wednesday afternoon and Thursday morning and distributed Thursday afternoon. Users of the information include their own members and others who pay for the service.

Kopint-Datorg. Kopint-Datorg is an economic research, marketing and computing company, which processes data related to foreign trade. Kopint-Datorg has been contracted by three separate organizations of the Hungarian government to develop a database related to international trade. The Customs office, Central Office of Statistics and the Ministry of International Economic Relationships contract with the Kopint-Datorg company to collect customs data and process it into a database. Currently, Kopint-Datorg receives data from customs in the form of the bill of lading and export certificate for all foreign transactions. They process that data into a database and pass the information to each of the three government organizations by magnetic tape. The database contains origin, value, volume and destination for all imports and exports in Hungary. No computer access is currently given directly to this database. The National Technical Development Commission is in charge of developing technical aspects for access requirements to the computer database.

Kopint-Datorg also collects information from other sources. Their program is geared to developing information for firms involved in international trade. They have also completed several studies for the World Bank on different agricultural areas and foodstuffs. This is a major activity for the organization. The additional information collected includes German wholesale market information and information from the major commodity exchanges in the U.S.A. This information is databased into a computer format for their purposes. The German wholesale and retail prices are an important part of this information, but a delay of two weeks is incurred before this information is received and then entered into the computer by Kopint-Datorg employees. Foreign commodity exchange information is received from

Reuters News Association, but is also keyed into their database. While this information is considered vital in the international market for Hungarian agricultural products, a delay of two weeks in making the data available to Hungarian citizens is usual. This delay weakens the value of the data for international trade purpose.

3. Other Market News Providers

Beyond the several organizations that collect data for dissemination are the many organizations that take that data and disseminate to a special group within the agricultural community. Some of those providers may augment the data in some way, but for the most part, they simply obtain the data they need from the various information providers and package it in a manner that they feel is best for their users. A listing of organizations which fit this mold follows, with a short discussion of their operations.

National Association for Horticulture. This is a national association of fruit and vegetable growers with a membership of 6,000. They have access to STAGEK information but do not use it because they feel it is unreliable. Their members meet monthly at the various wholesale markets in Hungary to discuss the problems they are facing. They are members of the Association of German Traders and get German wholesale market news as a member of that organization on a delayed basis. As such, the value of that data is considered diminished. They also collect information on the Soviet market and product standards required for the European market. They also collect some information by personal contact in selected other international markets. They publish a newsletter which is sent only to the largest members because of the cost involved. This newsletter is published twice each month.

National Association of the Hungarian Farmer Groups. There are 150 farmer groups organized in Hungary with a membership of 20,000 farmers. Their goals are to represent growers with the government, coordinate offers and demands, and to collect and disseminate information important to Hungarian farmers. They use the STAGEK market information system to gather information for dissemination. Information is disseminated by telephone and facsimile. They also collect some information from their members about production plans for the following season. Very little is done with this information because of a lack of knowledge of how to use it. They would like to develop more information to give better indications of production for each crop.

Hungarian Canners Association. (?) The Hungarian Canners Association is an association of canners operating throughout Hungary. The Association collects information on the quantity and prices of vegetables bought by members. They use this and other information collected from other sources (e.g., Budapest Commodity Exchange) for their members. They say they will not release this information to non-members because they feel it is valuable market information. They will publish the information in summary form at year-end.

Magyar Mezogazdasag. This is the Hungarian Agriculture magazine which is commonly referred to as the Green Paper. It has a circulation of about 15,000 and is a weekly, published on Wednesdays.

The Green Paper uses the STAGEK market information for wholesale prices of fruits and vegetables and the Budapest Commodity Exchange for prices of cereal grains and livestock. They gather some prices for fruits and vegetables in international markets from firms trading in the international market.

The Green Paper is a good source of information for many farmers who have no other means of getting market information. Its circulation size insures broad distribution of market news.

B. Critical Review of Current Information Network

Dissemination of unbiased market information in Hungary is an evolving technology. Some industries within the agriculture industry have progressed in their development of an efficient market information network. The fruit and vegetable industry has progressed further than most with the development of the STAGEK program with the aid of EC-PHAR. Many criticisms have rightfully been leveled against the STAGEK program. The worst of these is the unreliability of data. Market reporters are employed by the individual markets who are reporting in the network. They are poorly trained and not reporting reliable data into the system. As one user group has reported, unreliable market news can be worse than none at all. This reliability problem has lead to an industry group duplicating some of the market reporting of STAGEK.

In addition to the poor reporting in the fruit and vegetable industry, other industries are experiencing gaps of information. In agriculture, five companies were responsible for marketing virtually all agricultural products out of the local areas before the development of free market economies. The number of companies has grown and the market share controlled by them is shrinking, but there has been a lack of market information services developed to assist in this transition period. The successes in the free market transition have been experienced without the aid of good information services.

Continued success in the transition to a free market economy may depend on the development of adequate market information services. Additional information services need to be implemented and international data need to be included if Hungary is to enter the international market. These include access to commodity markets in Chicago for grains and livestock and possibly the International Trade Center database for fruits and vegetables in Europe.

III. Data Dissemination Practices in Hungary

There are several methods currently being used in Hungary to disseminate and collect market information data: telephone, telex, and fax. It is the team's recommendation that these

methods continue to be used and that others be incorporated, based on need, cost and availability. It must be understood, however, that these systems all rely on a very old and unreliable telecommunications infrastructure and other, more reliable means of information dissemination should be considered. (For example, using a PC based E/mail program called Seadog or FidoNet, electronic information can be sent from PC to PC, automatically, at night. See Appendix A for a more complete description.)

Hungary's communication systems, like other emerging democracies in Eastern Europe, is generally antiquated, unreliable and is not available to or affordable by the general populace. The telecommunication system is currently controlled and owned by the government Post, Telegraph and Telephone (PTT) Ministry and it consists of equipment that ranges anywhere from 1940 style mechanical switches, private branch exchanges and phones to state-of-the-art cellular and satellite systems.

A. Voice

For most of the country the PTT ministry system only offers voice lines and telex, neither of which is very reliable. In areas of major commercial activity (i.e. Budapest) the proliferation and quality of phone lines is better and other services such as cellular phones, international voice/data links, and satellite services are available. This is not to say that cities are communication bliss, but rather a hodge-podge of the old and the new. For example, calling from Budapest to London, or Washington, DC, is usually no problem and requires only one or two attempts, but a local call across town can take all day to connect.

The government realizes that a limited telecommunication system will severely hamper the efforts to modernize their economy and is working to resolve this problem. Several areas which the government is pursuing are the creation of a national public data network, permitting private joint ventures in the establishment of cellular transmission facilities, installation of two inmarsat transponders in Budapest for international links and planned privatization of the PTT ministry to begin in 1992.

B. Electronic Data (Public Data Network, FAX, Telex)

Public data networks are operated by competing telephone carriers and other private companies, although their services and rates are subject to some degree to government regulation. PDNs in Europe are generally government monopolies operated by each nation's post, telegraph and telephone (PTT) ministry. Each PTT offers on-demand, usage-based, data communications supporting asynchronous and X.25 transmission; some support synchronous and IBM 3270 protocols. Most EEC and some Eastern European countries allow privately owned PDNs to operate their own access points.

In 1989 the Hungarian PTT started operation of a limited public data network called PLEASE Data Communications Ltd. With the lifting of the COMCOM restriction in 1990, PLEASE was able to upgrade and expand the public data network. The PLEASE X.25

DATEX-P network is currently accessible in 20 cities with an additional 19 cities to be added by 1993. PLEASE offers most of the standard PDN services such as asynchronous access, interconnects with other international PDN services (i.e., Sprintnet, BT Tymnet, Infonet and others), bisynchronous access and virtually private networks.

The Hungarian government plans to privatize PLEASE sometime in late 1992. Privatization of PLEASE is critical to its future success. In two short years, PLEASE has established a technologically sound foundation for being competitive in the growing local PDN market but lacks experience in management, support, marketing and sales. PLEASE is the only provider of X.25 'point-to-point', services domestically. Internationally, PLEASE must compete with highly successful international X.25 service providers, BT Tymnet and Infonet, both of which have opened offices in Budapest.

Infonet, a privately owned, internationally accessible PDN, was one of the first private data communication firms to establish their own access in Budapest. Infonet has access points in over 50 countries. BT Tymnet, owned by the British PTT, currently does not have a node in Hungary but is negotiating with PLEASE to provide this service.

FAX use, while not as prevalent as in the U.S. or the EC, is growing. This is primarily due to the fact that Fax machines are fairly inexpensive and more importantly, easy and cheap to use. As a means of data dissemination, fax does have one major drawback: it requires the use of the local phone system, which has limited penetration in the country. The poor quality of the phone system results in longer transmissions and, therefore, higher costs. Often organizations have only a single phone line.

Telex use in Hungary for domestic communications is fairly high, relative to more industrialized countries. This is due in large part because a widespread telex network exists throughout the country. Telex, as a means of data dissemination, has several drawbacks, such as cost, limited access to telex machines, and the requirement for data to be re-keyed into a PC.

IV. Recommendations

In order to maximize potential usage of a market information system, methods of dissemination as wide and diverse as possible should be employed. The reasons for this approach, rather than focusing on a smaller number of channels of dissemination are:

- potential users differ greatly in their circumstances and ability to receive information in certain forms;

- users differ in their preferences and requirements for data transmission/receipt;

- dissemination technologies and the availability of means of receiving information are changing rapidly and the system employed should be able to accommodate these changes.

Specifically, the team proposes that information be disseminated through the media listed below:

- Local agribusiness periodicals
- Newspaper and Newsletters
- Telex
- Fax
- Computer networks (E/Mail, PC to PC using SEADOG)

The amount of information appropriate to each dissemination method will have to be determined based in part on available budget and the target audience. It is felt that to achieve optimal usage of any marketing information system, dissemination efforts should focus on low tech and easily accessed communications media (such as newspapers, newsletters, and telex) and not entirely on high tech communications systems (such as E/mail and On-line information systems). Each dissemination channel should be kept under review to determine effectiveness and whether it could be improved in some way.

It is also recommended that, in addition to making available "raw" market data, there should be appropriate training for managers on management decision tools to help in the interpretation of the data and the use of it in the organization. In order to make the information widely available and accepted, it should be offered at the lowest possible price.

The team also recommends that ACDI consider forming a close relationship with Kopint-Datorg and STAGEK. Since KOPINT-DATORG and STAGEK are currently in the process of creating a market information system, it is recommended that ACDI could work closely with these organizations to:

- promote usage of the STAGEK and KOPINT-DATORG systems;
- determine information areas which these organizations do not address and provide support in these areas (specifically international market and trade information, transportation);
- determine and promote more cost effective means of data collection and dissemination (i.e., Seadog, Radio Packet Switching, Public Data Networks).

Appendix A

SEADOG

Appendix A:

SEADOG

The "SEAdog" software is a full-featured electronic mail system based on the personal computer and using standard telephone lines. It is designed to be easy to use, yet powerful. But above all, it is inexpensive to operate. It can be used to send and receive messages and/or files. Any sort of file can be sent using SEAdog, including programs, word processor files, binary data files, and spreadsheets.

SEAdog is a sophisticated store-and-forward mail system with automatic message routing and redundant backup. Unlike some mail systems, the end user need never concern himself with technical details of mail routing and delivery -- it all happens automatically. The user just enters and reads messages, the system takes care of the details.

The following hardware is needed in order to use SEAdog:

- An IBM PC, XT, AT, or compatible, with 256k of main memory and a floppy disk drive. A fixed disk is highly recommended, but not required. Any IBM compatible display may be used.

- A Hayes command set compatible modem.

- A telephone line with access to an outside line, and which can be reached by direct dialing from outside. An internal PBX system can be used if no outside access is required.

A machine does not need to be dedicated to SEAdog; it operates during spare time.

SEAdog uses the FidoNet Electronic Mail Protocol, as defined in the document, A Basic FidoNet Technical Standard, published by the International FidoNet Association (IFNA).

The heart of SEAdog is the network mail server, MAILER.EXE. This is the program that places and receives phone calls, handles message routing, and so forth. It is left running when normally the machine is turned off.

Most people turn off their machine set the end of the day when they go home. The machine is then idle until morning. With SEAdog, the machine is left on and runs the mailer. The mailer waits until the early morning hours when phone rates are cheapest, and then begins placing phone calls to other SEAdog systems to pass them the outgoing mail. In the morning, one "takes down" (i.e. terminates) the mailer ands reads the mail.

Appendix B

PLEASE Ltd.

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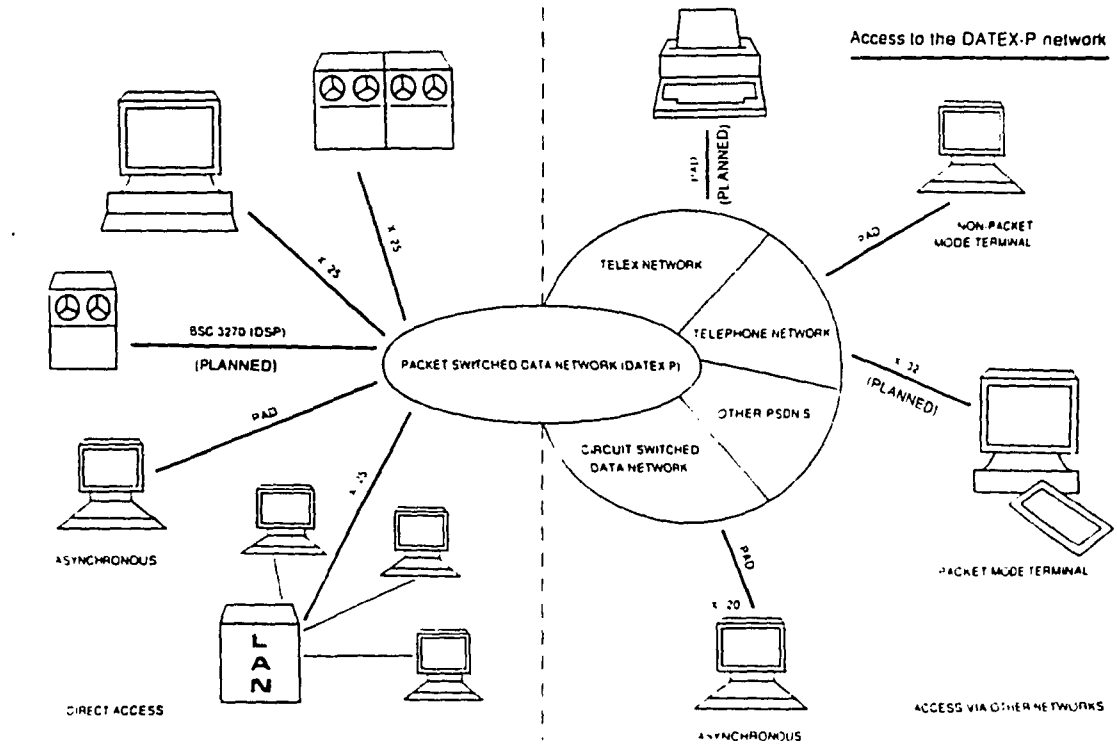
PLEASE

Data Communications Ltd.

Main features of the Hungarian Packet Switched Public Data Network (DATEX-P HUNGARY)

- connecting different data processing systems;
- high service reliability;
- negligibly small probability of error;
- services meeting the demands of small, medium and big users;
- information exchange between equipment originating from different manufacturers and operating at different speed;
- services confirming to International Standards;
- favourable utilization of communication path;
- acceptable tariffs.



The public packet-switched data transmission service started its operation in 1989 on the basis of national development. By lifting of restrictions regarding advanced technique (COCOM List) it became possible for us to put into operation a high-capacity, in its facilities wide-ranged system between 1991-1993.
The digitalization program of the Hungarian Telecommunication Company, the packet-switched system developed by Siemens are the guarantee that the data transmission demands of remote data processing could both regarding quantity and quality be satisfied.

OUR PRESENT SERVICES

The packet-switched data network makes possible a direct connection to packet mode (X. 25) terminal equipment
at speeds of

- 2400 bps,
- 4800 bps, further
- 9600 bps.

The asynchronous terminals have access to the network
as speeds of

- 300 bps,
- 1200 bps, further
- 2400 bps.

Data transmission equipment operating on telephone network can reach the packet-switched network at speeds of

- 300 bps (with V. 21 modem) and
- 2400 bps (with V. 22 bis modem);

while the asynchronous terminals of the circuit switched data network at the speed of

- 300 bps

following the call of the so-called PAD-s. For the reaching of the transitions an identification (NUI) registration necessary.
The network renders to the directly connected subsribers the facility of multiple acces (16 logic channels at a maximum) as an extra service.

IMPROVEMENTS OF THE NEAR FUTURE

A very considerable quantitative and qualitative expansion of the packet-switched data network will take place from autumn 1991 on. In Budapest, further in another 19 cities of the country small, medium, or high capacity exchanges will be installed in conformity with the demands. The network is capable to receive from any part of the country the subscribers.
The system makes possible a direct connection for the packet mode (X. 25) terminals at a speed of

- 64 000 bps too, from local networks.

The asynchronous terminals have access to the network
at speeds of

- 4800 bps and
- 9600 bps too.

The facility is ensured also for the direct connection asper process

- BSC 3270

of the synchronous (non-packet mode) terminals at speeds of

- 2400 bps,
- 4800 bps, further
- 9600 bps.

The telephone network and circuit switched data network transitions become two-directional, i.e.

a dial-out and dial-in can also take place.

The function of the telephone network PAD-s is essentially expanded. the establishing of connection with telephone network terminals of speeds of

- 1200 bps (with V. 22 modem),
- 2400 bps (with V. 32 modem),
- 4800 bps (with V. 32 modem) and
- 9600 bps (with V. 32 modem)

of non-packet mode, further-asper recommendation

X. 32

with telephone network packet mode (X. 25) terminals of speeds of

- 2400 bps,
- 4800 bps, further
- 9600 bps

is made possible too.

The existing network transitions are expanded. The dial-out and dial-in

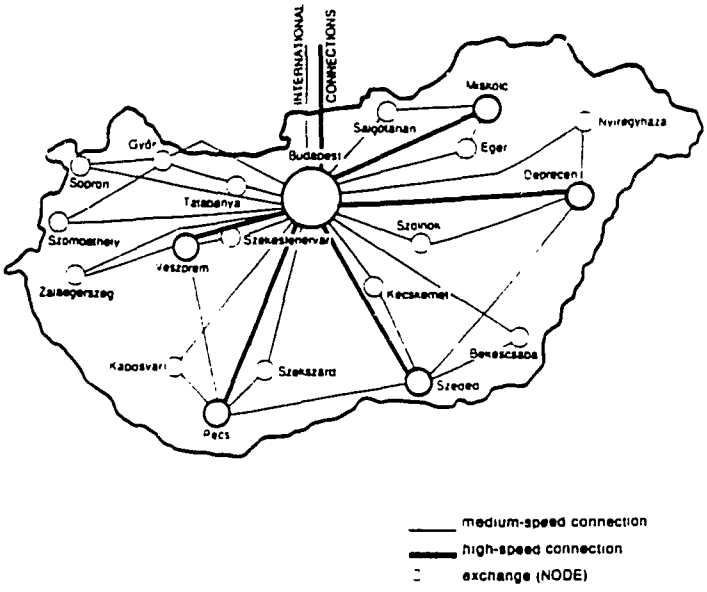
- in the telex network and
- from the telex network

become possible.

The scope of services is also considerably expanded, among others by the following elements:

- permanent virtual circuit (PVC);
- closed user group (CUG);
- call redirection;
- reverse charging;
- charging information for the subscribers;
- fast selection;
- setting-up of virtual private network.

The packet-switched data network covers the whole country



INTERNATIONAL RELATIONS

More and more companies and enterprisings establish offices or representations abroad. The foreign firms operating in our country require international relations as well.
In compliance with this – as a result of our developments – increasingly more possibilities present themselves to us to have access international data bases and electronical post office boxes etc. via DATEX-P network.

Already by now, the network is connected – directly or indirectly – with a number of European and overseas packet-switched data networks.
We are going to expand our international relations also in the future continuously.

Regarding the packet-switched data transmission service

PLEASE

Data Communications Ltd.

can supply further information.

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Phone: +36 1 117 7262; +36 1 251 7676
Fax: +36 1 252 1363

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Appendix C

Kopint-Datorg

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KOPINT-DATORG

Institute for Economic, Market Research and Informatics Ltd.

Budapest, Dorottya u. 6. H-1051
Letters: Budapest, P.O.B. 133 H-1389
Telephone: (361)1186126, (361)1186722,
Telex:22-5646 Telefax: (361)1186483
Account No: 202-45588, Hungarian Creditbank Ltd.

Joining the KOPINT Institute for Economic and Market Research (founded in 1964) and the DATORG Foreign Trade Data Processing and Organizing Co. Ltd. (founded in 1968), KOPINT-DATORG was established in 1987.

MAIN ACTIVITIES

- *applied economic research on world and national economy*
- *commodity market analyses, market studies and marketing services*
- *information on domestic and foreign businesses*
- *information on world economy and trade*
- *computer services*
- *development and sale of individual and standard software; adaptation*
- *consultancy on customs tariffs, taxes, investment, law, foreign trade, business management and company strategy*
- *trade and investment contacts, joint venture establishment*
- *training courses on foreign trade, marketing and computer usage*
- *national trade library and documentation center*
- *editorial and press activities*
- *sale of office equipments and computer*

PUBLICATIONS

in foreign languages

- *Business Partner Hungary - quarterly in English, French, German and Hungarian*
- *The New East Europe - in English and Hungarian*
- *Hungarian Business Brief - in English*
- *Economic Trends in Eastern Europe - in English, German and Hungarian*

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ASSOCIATED COMPANIES AND OTHER INTERESTS

AGROMARKETING Co. Ltd. 66.6%
Address: Budapest, VIII., Luther u. 6. H-1087
Phone: (361)113-7236 Fax: (361)133-6114

ARTHUR ANDERSEN AND CO. 40%
Accounting & Tax Consulting Co.Ltd.
Address: Budapest, II., Völgy u. 30. H-1021
Phone: (361) 116-7641 Fax: (361)176-2521

KOPCONSULT 64%
Foreign Trade Consulting Ltd.
Address: Budapest, V., Váci u. 17. H-1052
Phone: (361)118-2587 Fax: (361)118-2591
Telex: 22-3590

KOPÉP Co. Ltd. 50%
Marketing Agency for the Building Industry
Address: Budapest, V., Dorottya u. 6. H-1051
Phone: (361)117-1975 Fax: (361)118-6483
Telex: 22-5646

KOPI-KER Trading Ltd. 100%
Address: Budapest, V., Kálman u. 27 H-1054
Phone: (361)111-2083; 132-4392
Fax: (361)132-2544

KOPINT-DATORG 100%
Customs Consulting Ltd.
Address: Budapest, XI., Bocskai u. 9. I. 5. H-1113
Phone: (361) 182-0126 Fax: (361) 182-0126

KOPINT-DATORG 80.65%
Training Center Ltd.
Address: Budapest, XI., Villányi út 11-13. H-1114
Phone: (361)166-7399 Telex: 20-2791

Regional Business Center Ltd., Miskolc 46%
Address: Miskolc, Mszb tér 3. III.308. H-3501
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Fax: (361)46 47-285

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Representative: dr. György NAGY (Mr)
Address: 46 Eaton Place, London SW 1
Phone: 44-71/235-8767
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Appendix D

Europaritas

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EUROPARITAS

Management Consulting Limited Company

BACKGROUND AND EXPERIENCE

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Room 450/a-b.
H-1355 BUDAPEST P.O.B. 7
(Hungary)

Telephone 36-1-131-3549
Fax: 36-1-111-6878

EUROPARITAS's clients include department of the Hungarian Ministry of Agriculture, large and small scale enterprises in the Hungarian agricultural and agroprocssing sector (cooperatives, state farms, food processing and trade companies, private firsm). **EUROPARITAS** was a subcontractor of World Bank.

EUROPARITAS has a permanent team of specialists in agricultural and agroprocessing finance, marketing management, farm management, farm information systems analysis, as well as computer software design, development and implementation. To set up specific project teams, EUROPARITAS can easily contact a list of different kind of management specialists with international experience and other consultants. **EUROPARITAS** has close contacts with relevant Hungarian university, institute and research groups, which can provide expert assitance if necessary. EUROPARITAS has relations with relevant west European and American universities and business companies.

Established in 1991, **EUROPARITAS** is a privately owned company separated from MUSZI Inc. In the establishment of its basic services, **EUROPARITAS** could utilize the experience gained inthe activities started in the Ministray of Agriculture's Centre for Statistics and Economic Analyses and continued in MUSZI PARITAS during the last 10 years.

EUROPARITAS operates an office in the building of the Ministry of Agriculture.

VOROS Mihaly
managing director of **EUROPARITAS**, graduated from Budapest University of Economic Sciences as an agricultural economist, has trained in systems analysis and programming with the U.S. firm Control Data, has a PhD in agricultural informatics and attended other additional training in major west European countries as well as in the United States; he was involved in several agricultural information systems and was a government advisor in the Ministry of Agriculture's Centre for Statistics and Economic Analyses for the last 15 years; he is a consultant in agro-industrial financial management, agricultural marketing and farm management, as well as in agricultural MIS/DISS systems.

EUROPARITAS

composed of full-time and part-time experts, most of them with international experience in the following fields:

- farm management of agro-industrial companies
- management of agro-industrial companies
- agricultural marketing
- food product development and quality control

- financial analysis o agro-industrial investments
- agricultural, agro-industrial information and decision systems
- business plan preparation
- transfer of technology
- socio-economic evaluation of agro-industries
- agricultural extention development

SERVICE PROVIDED BY EUROPARITAS

PROJECT MANAGEMENT

- Assistance in agricultural and rural development project preparation, including data collection and information service.
- Organizing specific project teams for surveys and studies in Hungarian or East European agricultural, agroprocessing and rural development (marketing information, extention development, privatization, company restructuring, etc.).
- Organizing specific project teams for agricultural information system developments in Hungary or Eastern Europe.
- Developing and operating World Bank Project Monitoring and Evaluating System on microcomputer for the users in Ministry of Agriculture and commercial banks.
- Project evaluation based on Dun & Bradstreet Key Business Ratios.
- Development and adaption of project management software for planning, scheduling, control and evaluation of different kinds of projects in the agribusiness sector.

FINANCIAL MANAGEMENT

- Development and operation of PESO (Financial Analysis and Projection Service System) supporting World Bank, PHARE, and other development projects preparation and implementation.
- Conversion of Hungarian balance sheet according to World Bank requirements.
- Calculation of Dun & Bradstreet Key Business Ratios for enterprise level and for relevant agroprocessing subsectors.

- Information service on PESO-based financial analyses and projections.

STRATEGIC BUSINESS PLANNING

- Company survey and privatization program preparation.
- Elaboration of loan request materials for preparation of agricultural investment projects (identification and evaluation)
- Feasibility studies
- Market studies

INFORMATION SYSTEM MANAGEMENT

- Information systems survey
- Application software design, development and/or adaptation, implementation

EDUCATION ADN TRAINING

- Organizing of professional workshops, courses, study tours, forums
- Management training
- Marketing training
- Financial management training
- case studies
- Joint venture business forum
- Study tours, conference participation

REFERENCES

Ministry of Agriculture Dept. for World Bank Coordination

Ministry of Agriculture Dept. for Food Industry

Ministry of Agriculture Dept. for Professional Education

Ministry of Agriculture Dept. for International Affairs

Ministry of Agriculture's Centre for Statistics and Economic Analyses

National Commercial and Credit Bank, Budapest

Seed Company Ltd., Budapest

"Tapiovolgye" Agricultural Production Cooperative, Sulysap

"Szamosmenti" State Farm, Mateszalka

"EUROPALETT" Limited Company, Mende

Budapest Confectionary Co.

"HUNGAVIS" Poultry Foreign Trade Co.

Association of Poultry Producers, Budapest

Meat Products Trade Service Co., Budapest

Agricultural University, Godollo

Agricultural University's Post Graduate and Management Training Institute

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University of Minnesota, Minneapolis, USA

Oregon State University, Corvallis, USA

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