RECOMMENDATIONS FOR IMPLEMENTATION: DONORS TO AFRICAN EDUCATION INFORMATION SYSTEM

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INTRODUCTION

This report represents the findings of an investigation and evaluation of the implementation requirements for a project information system to be utilized by the Donors to African Education (DAE). This effort was undertaken in response to a request from the "Action Group" of the DAE for recommendations relating to the proposed system.

The purpose of this project information system will be to allow and promote the sharing of information on educational projects in Africa. It is hoped that the sharing of project information among donor agencies will aid project planners and promote cooperation among donor agencies. The information that will be contained within the database is not meant to be exhaustive, but rather to provide a basic description of projects and furnish contact information as a source for further investigation.

This report addresses the following issues:

* Technical aspects of system implementation including choice of computer hardware and software platforms.

* Advantages and disadvantages of utilizing the SPAAR information system in this effort.

* Dual language (French/English) capability including a French/English thesaurus and keyword descriptors.

* Resources and time required to implement the project both for the development of the computer system at the central focal point and at the user level in the local focal points.

* Recommendations for implementation.

EXECUTIVE SUMMARY

The DAE project information system will be implemented as a database of information comprising, initially, fields of information corresponding to those described in Attachment B of the "Donors to African Education (DAE)-Terms of Reference".

System Requirements

The information system will include the following characteristics:

* Be extremely easy to use incorporating menu driven operation and computer displayed data entry, editing, and viewing forms.
* Incorporate use of Help screens.
* Where appropriate, utilize data checking and validation.
* Have mechanisms for initial load of large quantity of data plus easy to use update process.
* Possess security to allow only authorized users to change or add information in the database.
* Have dual French/English capability where individual users will choose the language with which the computer will display menus, forms, and data.
* Utilize a thesaurus of French/English synonyms for keywords.
* Possess the ability to list keywords in both languages for textual fields in the database.
* Allow for the easy generation of pre-specified and pre-formatted reports plus have the ability for users to request ad hoc reports without extensive training.

Computer Software Recommendation

The software tools or platform which should be utilized in the development of this project information system is R-BASE 5000 from Microrim Corporation. This is an easy to use, yet powerful, modern relational database package in use throughout the world.

Computer Hardware Recommendation

The computer hardware suggested to implement this system will be an IBM PC AT Compatible computer plus the typical peripheral equipment. In some user organizations where such a computer already exists, it might be possible to share the computer between applications.

Level of Effort

The software, from the beginning, should be designed with dual language French/English capability. In addition, it should utilize a French/English vocabulary with keyword search capability in both languages. Without these requirements, the software system would be fairly trivial to design and program and would take an estimated three weeks to complete. It is these particular requirements that make this project significantly more difficult to implement and maintain and will cause the implementation design and programming effort to rise to an estimated 11 weeks. However, these requirements appear to be necessary and should designed into the system from the beginning.

Personnel Requirements

The talent required to implement this information system will be concentrated at the central focal point within World Bank headquarters. The following personnel will be required:

Project Manager - full time for first four months, probably half time for the remainder of the project life.

Software Developer - full time for first four months, sporadically required thereafter.

Data Technician - full time for approximately one month during main database information loading phase, part-time on a periodic basis thereafter.

In addition to the above, the central focal point will most probably require administrative/secretarial support on a part-time but on-going basis. It is possible to combine the above staff categories into one or more persons having the requisite skills.

Other Requirements and Considerations

It is important to understand that there must be active communication between the project manager/software developer and the user community during the design and implementation phase of this system. The professional and prudent development of this system will require interactive, and sometimes iterative, communications between the project development staff and the users of the system.

Requirements at the user's focal points consist of two basic elements. These are (1) organizational change, and (2) electing a resource person and a backup resource person within the organization responsible for the DAE project information system.

The management of each user organization will need to mandate the existence and integration of this project within the existing framework of his organization. This will require, among other things, making components of that organization aware of this project, motivating staff to use and interact with this project, and instituting protocol for bi-directional communication of information to and from this project focal point.
The resource person (and backup) will require no further technical skills then being able to learn how to operate complex office equipment and follow directions. An ability to communicate well with other staff, train and promote the use of the project capabilities within that institution, and attention to detail in communications with the central focal point at the World Bank headquarters will be helpful. This resource person should be knowledgeable concerning project details.

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I DESCRIPTION OF THE DAE INFORMATION SYSTEM

I.1 The Users of the System

The users of the DAE project information system will consist of project planners and possibly other donor agency staff involved with educational projects in Africa. These users will represent, initially, approximately 25 international agencies engaged in development efforts in Africa. Many of the users will be French speaking and, therefore, one requirement of the system will be that is operates in both English and French language modes.

Some of the users will have experience with, and understand, computer applications. It is not reasonable, however, to assume that most of the users of this system will have meaningful knowledge and experience with computers. Therefore, one requirement of the system is that it be very easy to use requiring no previous computer experience and having a very short learning curve.

I.2 Goals for the Project Information System

The goals for the system are very simple and straight forward. This system should allow project staff engaged in educational activities in Africa to utilize an easy to use computer system to search through a database of project information for projects having specific areas of interest to the user. The user should be able to specify parameters for the search and utilize keywords that correspond to his or hear specific interests in the search. The system should tag all projects matching the user's search criteria and display the project information that corresponds to the user's request. Hardcopy printouts of the retrieved information will be possible.

I.3 General System Requirements

The following lists the important generalized requirements for the DAE project information system. The system must:

(1) Be very easy to use employing menu driven operation, fill-in-the-blank computer screens, on-line help screens, simple and easy to follow instructions and written documentation (user manual).

(2) Incorporate methods to allow regular update of information within the database.

(3) Have security measures incorporated that will not allow unauthorized users to change information or modify the computer programs.

(4) Be flexible and allow change and enhancements as requirements change without a major reprogramming effort.

(5) Be relatively inexpensive to implement in terms of computer hardware and software acquisition, and in the cost of software development or programming of the system.

(6) Incorporate keyword search capability for human language fields within the database.

(7) Have dual language (French/English) operational modes where computer screens, forms, and menus will be displayed in either language depending upon the mode of operation.

(8) Utilize a dual language (French/English) thesaurus which will allow access to all information by keyword search regardless of the original language of input and the current language of query.

(9) Allow flexible and easy to use generation of ad hoc reports as well as the generation of standard reports.

II USER GROUP

A User Group should be responsible for communicating with the central focal point, specifically, the Project Manager/Software Developer, to insure that the needs of the entire community of users are adequately presented. Computer applications should not be created in a vacuum. It is important that the software developer and project manager (these may be the same person) communicate with the group that will be utilizing the system, not only before implementation, but during system development as well. Computer menus and forms displays, as well as functional components of the computer system, should be reviewed by the users periodically during development to insure that the requirements of the users have been expressed and understood correctly by the developers of the application. Since it is not feasible for the development group to communicate with all of the potential system users, a representative group of users should voice the needs of the entire user community to the system developers.

The task/user group for this project must represent the interest of all of the various users of this project information system. It is therefore recommended that the current task group take steps to insure that its composure fully reflects the community which it represents. Having both English and French speaking members of the donor organizations serve in the task/user group would be helpful.

III FUNCTIONAL SYSTEM SPECIFICATION

There does not exist a specific functional definition of the proposed DAE system to date. Attachment B of "Donors to African Education Information System", which is a well defined list of data fields to be included in the database is an excellent start at describing the system to be implemented. In addition to this, it is important that a group of potential users of this system be given the opportunity to review a specific functional definition and make additions and/or amendments.

A functional definition of the system wiil exactly describe, in English/French, the operations that can be performed with this system. It can be illustrated with diagrams of the menus that will be displayed on the computer screen and with flowcharts of available options and actions within the system.

There is much technical work that can begin before a functional definition is developed and approved by the users. The functional definition should, however, be approved before the final before technical implementation of the software system is significantly complete. Although this application is straight forward, the users will want to have input concerning the system operation and layout of menus and forms.

IV DESIGN CONSIDERATIONS

Data Elements

All of the data fields listed in the worksheet (attachment B) of the terms of reference be included in the initial design of the database. All of these fields should be available for display by the system user by means of multiple part forms that will appear on the computer screen.

Access Rights to the Data (Security)

There will be basically two levels of accessability to the information in the database. One level will allow only viewing of the data. The other level will allow viewing and editing (deleting, adding, and modifying entries). One additional type of access will be by the World Bank focal point who will have update access to each user's data. The central focal point at the World Bank should be the only place where access to modify computer programs/database structure is possible.

Viewing and Entering Data

Both the viewing and the modifying of the information within the database will be via forms displayed on the computer screen. Entering data will be a fill in the blank operation. To facilitate the entering of similar data, default field values could be utilized to eliminate the need to retype the same data in different project records.

Dual Language Display of Screens

This system will accept and display information in both the English and the French languages, depending upon the current mode of operation. This mode of operation will be set at the beginning of a system session by the using indicating which mode he or she prefers.

Data Fields

There will be three ways in which data fields are handled, depending upon the type of data in a particular field. If a data field can be represented in a numeric or coded alphanumeric manner, it will be insensitive to language case. If a field is designed as a keyword or keyphrase field, the data within the field will be translated from and to English and French, depending upon the mode of operation. If the data in a field is "free form", e.g. several words, phrases, or sentences, this field will NOT have keyword/keyphrase search capability and will not be translated into the other language. For this type of field, regardless of the current mode of operation (English/French), the data will appear in the language and as it was originally input. However, text searches in free form fields will be possible without translation.

Input and Editing of the Data

Each user (Donor) will be allowed and expected to update the information in the database pertaining to that particular's Donor's activities. Periodically, the user will be required to transmit to the World Bank focal point his updated information. The focal point at the World Bank will have the responsibility of integrating all of the user information updates into one consolidated database and retransmit the updated database back to all of the users.

The individual users should not have access to data that does not pertain to their own activities and organization. Design questions such as whether all users at a local focal point are allowed to update that organization's data or whether this function should be reserved sole for the resource person need to be answered.

Consideration should be given to developing special software solely for the purpose of initially collecting an organization's project information as opposed to integrating this function with the normal operation of the system.

Viewing the Data

The user will be able to look at all of the information on each project, displayed by various types of computer screen formats sequentially. The user will also be able to do this after he has selected a group of projects that matches certain criteria. This may be done through the keyword search facility.

The user will be able to specify specific fields and request that all project with information matching the parameters he supplies for those fields be selected for viewing. On fields that contain words or phrases, the user will be able to request those projects with matches in the selected fields be retrieved. In the dual language system, there would need to be a look-up table for every world/phrase entered into the text fields to provide for English/French translation. Displaying of all of the different keywords for a particular field, in both French/English, would be desirable.

Hard Copy Printouts/Reports

The user should be able to request a formatted printout of the information which he has selected and is displayed on the computer screen. This may be an exact duplicate of the display on the computer screen, or it may me in other formats as well. Sometimes, the user, through a selection process, will retrieve more project information than can comfortably be view on the computer screen. In this case, the user should be able to request that all of the information be printed out in a convenient format.

V COMPUTER SOFTWARE

There are a range of possibilities for software platforms on which to build the DAE project information system. This range represents, on one hand, utilizing the SPAAR information system and, on the other hand, various modern and sophisticated relational and hierarchical database packages produced by major software vendors. Concerning the latter, two choices that are most appropriate are (1) R-BASE 5000 by Microrim and (2) DBASE IV by Ashton Tate. There are other types of similar packages that would also make acceptable software platforms.

V.1 Advantages/Disadvantages of the SPAAR System

In determining how to implement, in software, the DAE project information database, the first thing that comes to mind is the CDC-ISIS system which has successfully been implemented on PC types of computers. This represents a good and reasonable choice since it was designed to handle textual data and operate in conjunction with a thesaurus and in the context of both the French and English languages. In addition, the SPAAR system is well known in the development community. The SPAAR system has the capability to be altered to particular applications by the addition of field and field descriptors within the database.

Some of the disadvantages of ISIS with regard to the DAE implementation are:

(1) It does not readily allow for the use of new menus and forms compared with commercially available database packages. In conjunction with this, there have been complaints from SPAAR user community concerning the difficulty in operating the system from a user point of view.

(2) It is written in Pascal and therefore would take, comparably, considerable time to make significant changes in database structure, and interactive applications.

(3) The expertise required to develop, manage, and maintain the software system is highly specific and, compared to modern database packages, difficult to find.

V.2 Advantages/Disadvantages of Database Packages

Utilizing one of the leading modern and powerful database packages will insure that the expertise to implement, maintain, and update the software system will generally be readily available. In addition, expanding the system for future increased requirements, and making changes to database structure and display forms and menus, will be much easier and more quickly accomplished then if a traditional computer programming language were used.

Some of the disadvantages of utilizing these packages are:

(1) Because these packages are relatively powerful and easy to use, one tradeoff is that they generally require a more powerful computer hardware base from which to operate. Whereas a system programmed in a traditional computer programming language might run fairly well in an older style PC type of computer (8088 or 8086 processor type), these modern database packages require the faster processor (80286 and 80386) and more computer memory to run with adequate performance.

(2) Modern database packages are necessarily generalized in nature. Typically, an application programmed on one of the packages would take significantly more disk storage space to store the same amount of data then an application programmed in a traditional programming language. Also, the database product itself occupies considerable disk storage space even before the application is developed.

V.3 Advantages/Disadvantages of R-BASE 5000

Although both D-Base IV and R-BASE 5000 would both make good software platforms for the development of this system, R-BASE 5000 is recommended because it is much more

capable in the handling of text fields than DBASE IV. The application, except for the dual language capability, is a fairly simple system to implement. Handling of the French/English thesaurus and keyword search requirements represents a sophisticated text handling task. While both R-BASE and DBASE are know throughout the world, R-BASE 5000 will provide better facilities to implement the sophisticated text handling requirements.

Both DBase IV and R-BASE 5000 are distributed in French and English versions. Both packages offer sophisticated data handling capabilities in a flexible and easy to manipulate environment. Both offer powerful programming capabilities and screen and menu formatting. They each have their own technical advantages and weaknesses but discussion of these technical issues are not appropriate to this report. DBASE does, however, represents a larger base of users throughout the world than R-BASE.

V.4 Design of the Software System

There are many ways to implement the same functions with computer software and the technical design of the software should be left up to the implementor. Some general ideas concerning the software implementation, however, are as follows:

(1) Both DBASE and R-BASE, and probably other packages as well, are sold in separate English and French versions. This affords the implementation group the choice of utilizing different language versions of the same product or developing the application on the same language version of the package. Again, both methods have their strengths and weaknesses and the software developer should make this technical choice.

(2) If the system is designed and implemented in a single language, it will be a very straightforward and not very complicated exercise. Keyword searches, especially in R-BASE, will be extremely easy to implement. Once a dual language (French/English) capability is taken into account, the translation for keyword searches adds a significant amount of complexity and difficulty in implementing and maintaining the system.

2.a Dual language menus and editing/viewing forms will be easy enough to implement. A question at the beginning of the session could ask what language the user wishes utilize during that session.

2.b For every field that contains language text, possibly except for comment fields which tend to be lengthy, a translation table must contain the English/French equivalent for every entry. Determining and entering the equivalent phrase in the alternation language would probably fall into the hands of the administrating group at the central focal point in the World Bank. Not only would this exercise be labor intensive, but it would require a much greater effort to program and require significantly more disk space and computer processing power.

VI COMPUTER HARDWARE

It will not be necessary for the donors to purchase new computers if they already have on hand a PC type of computer, matching the following description, available for this project.

The hardware recommended for this project is a Personal Computer, substantially compatible with the IBM PC/AT models. The computer should have as its main processor either a 80286 or an 80386 processor chip. If the computer will be used mainly for this project, then it should have a hard disk of, at least, 20 megabyte capacity. If the computer will be utilized for major functions other than this project, then it should have 10 megabytes of hard disk space set aside for this application. Five and one half inch high density floppy disk drive and three and one half inch high density diskette drive should be part of this configuration. Any standard monochrome or color monitor will suffice. An inexpensive printer will be necessary. A telephone modem and communications software may be installed to allow for telecommunications.

Although a standard IBM PC (or 100% compatible) with the 8088 processor will run the database packages (DBASE and R-BASE), processing time will be slow and these computers typically do not have the high capacity disk drives which the AT models usually possess. If a hardware configuration utilizes only the low density 360 Kbyte floppy disk drive, the task of updating a large database via diskette will pose a problem. The update task itself would be very slow, prone to errors, and would involve mailing up to 20 diskettes back and fourth through the mail. This would cause logistics problems not only at the local focal points but handicap the operations at the central focal point. If several organizations had non-standard hardware configurations requiring special handling at the central focal point, the complexities could easily get out of control.

One of the requirements of this project is that the database be implemented quickly, be easy to use, and be easy to maintain. This precluded building the system from a traditional programming language like C, Pascal, Fortran, etc. The most obvious choice of software to build the desired system is a modern database package available for PC type computers. These packages are very powerful but require the host computer to be in the upper range of data storage capability and processing power to function adequately. This is why the host computer should have a 80286 or 80386 processor. This type of processor will also help reduce processing time so that the user will not wait an unacceptable amount of time to see the results of his query. An absolute minimum of 640 Kbytes of memory will be necessary and one to two megabytes of memory would be a better choice, depending upon the processor used. The computer should come with either the PC-DOC or MS-DOS operating system, preferably MS-DOS version 3.3.

VII ORGANIZATIONAL CONSIDERATIONS

VII.1 Local Focal Points

Every donor organization that wishes to utilize the DAE database will have to make some organizational changes in order to accommodate the requirements of this information system. These changes will fall into the following categories:

(1) allotting staff resources for the installation and maintenance of this system

(2) allocating/procuring equipment, supplies, and space necessary to operate the system

(3) providing management directives, protocol, incentives and motivations for using the system, and training of potential users of the system.

Most of the cooperating agencies will want to utilize the computerized DAE database to query the system for information particular to their own needs and planning process. Organizations without the ability to utilize a computer will be able to contribute to the information in the database. They will also be able to share in some of the benefits of the system. For instance, groups without a computer will be able to send data on their projects into the system by completing manual paper forms. In turn, they will be able to receive a report on paper of all of the integrated information within the database. As the database becomes larger, one option for those contributing groups might be to request specific types of information retrievals from other groups nearby or from the central focal point and have it FAXed or mailed to their destination.

Staff Resources

Although the DAE database system will be easy to use and not require specialized computer expertise, a resource person, and a backup person, will be required part time for this project for every donor institution involved. This resource person will liaise with the central focal point (World Bank) for updates of information within the database, installation of the system, helping other staff use the system, and organizing the data to be input into the system. Additionally, this resource person will represent the other staff in his or her organization as to that institution's special requirements, complaints, and suggestions to the central focal point.

This resource person will be required only on a part time basis but his or her presence in that institution will necessarily be an on-going condition for success of this project within every donor agency. It should be noted that, in the beginning and startup phases of this project, this person's involvement in this project will necessarily be more intense and demanding as the data is collected and recorded and as training of other staff is begun.

The resource person (and backup) at local focal points within each donor organization will not require in-depth knowledge of computers. He or she will be required to possess the following abilities and skills:

(1) General knowledge on how to turn the computer on or off, perform backups of the data contained within the computer, set up and operate the computer printer. This represents no more complexity than becoming familiar with the operation of office equipment such a FAX machine and photocopying equipment.

(2) Become very familiar with the documentation and the operation of the software system. This system will be very user friendly and be driven by menus but intimate knowledge of all of the functions and operations of the system will insure that this resource person will be able to help other staff fully utilize this tool.

(3) Communicate effectively with other staff within the organization to facilitate information gathering and exchange and be generally knowledgeable about the type of projects being implemented.

Equipment, Supplies, etc.

Most organizations will want to have a computer available so that they can query the database of information at will and in any number of fashions pertinent to their own multiple and specific needs. To accomplish this, an organization must procure a PC AT

type of computer and associated equipment, supplies, working space, etc. This does not mean that an organization must necessarily purchase a new computer specifically and solely for this project. Compatible computers within an organization may be shared among projects. Supplies will be required such as computer paper and diskettes. The resource person will require methods of communicating with the central focal point such as telephone and Facsimile capabilities. Of course office space including filing cabinets will be required to maintain this project.

Protocol, Management Directives, and Staff Motivation

There will be much more than just the technical implementation of a computer system to make this DAE information sharing project succeed. At each an every organization that plans to utilize the system, the desire and capacity to use the system must be established by management.

Protocol for directing project information from various elements of the organization and for disseminating information from the organizational focal point throughout the agency will need to be developed. Making agency staff aware of, and motivating their use of, the DAE project database will be critical task for management. Thought must be given to integrating the DAE project information system within the organization it will serve.

VII.2 Central Focal Point

The central focus of the DAE project information system will be located at World Bank headquarters in Washington, D.C. This focal point will be responsible for the following:

(1) Coordination of communication between and among the users of the system. This will include formalizing functional specifications of the system.

(2) Developing the system software, testing, distributing, collecting suggestions/complaints from the user community, providing updates to software to increase functionality and fix problems.

(3) Providing documentation and training, acting as a central resource to answer questions and give advice on the use of the system, act as advisor for the users in procuring computer equipment. In addition to user manuals and documentation, maintain all internal documentation and system specifications in good order.

(4) Provide the coordination and direction in assisting the users to collect, organize, and forward the initial data gathering effort to populate the database. Act as central collector of updates of all data from user organizations, integrate the information updates into a new comprehensive version of the database, and distribute the new versions of the database to the user community.

(5) Compile the French/English thesaurus and controlled vocabulary of keywords. This will require significant labor in compiling and translating French and English terms.

Staff Resources

There will be multiple skill sets required at the central focal point. These skills will be required in varying degrees at different points during this project implementation and

continued maintenance. The following describes the skill sets which will be required by this project.

Project Manager - A project manager will be required throughout the life of this project. His major functions will be:

(a) Communication with the users of this system, confirming the functional specifications of the system with the user community.

(b) Supervising the technical implementation of the system.

(c) Evaluating requests for changes and problem reports.

(d) Supervising the compilation of user and system documentation.

(e) Supervising the dissemination of documentation and information about the system.

(f) Supervising the gathering, integrating, and disbursement of project data and the updates to the project database.

(g) Monitoring the overall effectiveness of the project.

The skill set that the Project Manager should posses is as follows:

- Experience in implementing various computer related projects with managerial expertise.
- Bi-lingual (French/English).
- Strong experience with PC computer systems, good knowledge of database concepts and packages, word processing, and telecommunications.
- diplomatic and excellent communications skills

Software Developer - A database specialist will be required during the implementation of this project. He or she will also be required during various points in the life of this project when major changes will be required in the database function and/or structure. This database specialist will be required to perform the following:

(a) define the structure of the database including field length and types, table definition, key and index structures, retrieval and keyword search philosophy, technical implementation of English/French thesaurus and controlled vocabulary and mechanism of dual language keyword/keyphrase search.

(b) design (dual language) menus and computer screens for viewing, modifying, and updating the data. Define methods of access to data, security access limitations, and methods of operating from both a user and central control point of view.

(c) compile system documentation explaining theory of design and implementation of the system. Help with the compilation of a user manual.

(d) develop user friendly user interface with preprogrammed retrieval mechanisms and report formats.

(e) design and implement database update and backup mechanisms.

The skill set that the Software Developer should possess is as follows:

- In-depth knowledge of database philosophy and design.
- Strong experience with PC systems, MS-DOS/PC-DOS, and R-BASE 5000 or similar database product.
- Several years experience as computer programmer in a language such as C, Pascal, COBOL, or FORTRAN.
- Experience with requirements analysis and excellent communications skills.

Bilingual Data Technical - A bilingual (French/English) data technician will be required throughout the life of the project. During the implementation phase, the skills of a data technician will be heavily required when collecting the survey data and when populating the database. After the initial load of information from all of the donor agencies, the services of the data technician will be required intermittently during cyclic database updates and during normal but irregular database maintenance of data.

The skill set that the Data Technician should possess is as follows:

- Bi-lingual French/English, experience with technical translations.
- Previous experience with PC computer data entry.

Secretarial Support - The typing of documentation and manuals, filing, handling of correspondence and telephone calls and messages will require some type of administrative/secretarial support throughout the life of this project.

Different phases of this project will require varying degrees of concentration in the above skill sets. The initial software development of the database will require full time effort for an estimated three months. Once the software has been developed and tested for the initial release to the user community, only short term and intermittent requirements of this skill set will be required.

The skill set of the data technician will be required throughout the life of this project. The single major requirement will be during the initial data gathering and population of the database. Thereafter, this skill set will be required most probably for ten hours per week and in a much greater extent during the cyclic database update process which has been proposed at a six month interval.

Secretarial support will be concentrated during the initial implementation and data gathering phase and during the cyclic update process of the database. At other times, secretarial support will be required on a minimal basis.

Equipment, Supplies, Etc.

Because the central focal point of this system will be responsible for the software development effort, it will require the full time use of a PC AT compatible computer. In addition, it will require the following:

* developer's software license for the database package
* a word processing package

* access to a facsimile machine
* access to a letter quality computer printer

Supplies of computer paper and diskette will be required as well as typical office space, furniture, file cabinets, and clerical supplies.

Management

The Project Manager at the central focal point should be in charge of the technical implementation of the project information system. He should establish and utilize close communication with the user group of the DAE established to represent the donor organizations in this project. The Project Manager should supervise the Software Developer, Data Technician, and such administrative and secretarial assistants as are available. The Project Manager should be responsible directly to the Secretariat of the DAE.

VIII USER TRAINING AND DOCUMENTATION

The DAE project information system will be designed to be very easy to use. Personalized training should not be necessary for the users of this system. Computer menus will guide novice users through the system's capabilities and explain operation and options with on-line help screens.

Written documentation in the form of a French/English user's manual will accompany the system. This user's manual will explain system operation and illustrate the use of the system through pictures of computer screens with highlighted user responses. In addition to the project information system, the documentation will illustrate how to back up the system database and programs onto diskettes to guard against hardware failure and human error.

If additional assistance is required by the local resource person, telephone contact with the central focal point should resolve the worst problems.

IX COLLECTING PROJECT DATA

Initial Data Gathering

Because the project information for this system has never been centrally collected and examined, the specific nature of this data will only surface after a representative sample has been collected. One of the first jobs of the Project Manager should be to establish

what organizations make up a truly representative sample of the entire user community and request that they collect project information, fill out the data sheets already devised by the task group, and forward that material to the central focal point.

The Project Manager should encourage comments and any additional information which the users would care to give. The representative sample must include both French and English speaking organizations.

Once the sample of data is gathered and studied, the necessity of changing the present field definition and layout can be expected. This exercise should be carried out in an atmosphere of collaboration between the user organizations and the project manager/software developer in the central focal point.

Depending upon the condition of the information within the various donor organizations, it may take several weeks, even months, to collect this sample of project data. This lag time should be taken into consideration in planning the final implementation of the project information system.

Population of the Database

Initial design and implementation work on the software system can begin before collecting the representative samples of project information. Once this sample has been studied, constructive communications between the local and central focal points has taken place, and the software system has been adjusted to fit the actual characteristics of the data as revealed by the above process, the system will be ready for the complete loading of the actual project data from all of the contributing donor organizations.

It will be up to the Project Manager and Software Developer as to the specifics of this operation. Some options in implementing this task are:

(1) Utilize a "finalized" datasheet to be filled in manually by the various donor organizations and transmitted back to the central focal point where a data technician would type in the data and construct a dual language thesaurus and keyword vocabulary.

(2) Utilize data input programs designed by the software developer to allow local focal points to input and review their organization's data and then transmit it to the central focal point. In this scenario, the data technician and/or the software developer would be responsible to integrate the data from the various organizations into a single database as well as constructing the thesaurus and keyword vocabulary. In this instance, significant time and effort would be saved because, at the central focal point, the data would not have to be retyped but read directly from magnetic computer media.

(3) Combinations of both methods above can be utilized. In addition, where possible, it may be advantageous for users to transmit their data to the central focal point by telecommunications (telephone modem) rather than by diskette. Both options should be looked at.

The initial population of the database will be a significant and labor intensive operation. Regardless of the method used, building the French/English thesaurus and keyword vocabulary lists will require detailed effort by the data technician and significant communications between the local and central focal points for purposes of clarification. This will result in a large telephone expense and, provided that the users at the donor organizations are prepared for this effort, will take an estimated three months to complete.

Updating the Database

Once the initial population of the database is significantly complete, updating of the project information will take place in regular cycles. This update cycle is initially estimated to occur every six months. It is recommended that the project start with this six month cycle and then adjust it later on in the programme as experience dictates.

Corrections to the information in the database can be expected, immediately after the initial population, to occur in a continuous manner for the next few months. Once the database seems to be under control, the cyclic update of information should cause significant activity at the central focal point for up to one month as most organizations transmit their regularly scheduled data files or forms on time. Thereafter, updating activity at the central focal point will decrease until the next cycle begins.

Distributing the Updated Project Information

Secretarial/administrative support will probably be most heavily required during the information update phase where materials will be mailed/FAXed/telecommunicated into the central focal point, processed, then transmitted back to the various user organizations.

After the integration of updates to the project database is complete, the updated versions of the project database will be distributed to the resource persons within the donor organizations. The update process at the local focal points should be a relatively easy task that the resource person can accomplish without significant expertise with computer systems.

IX CONCLUDING REMARKS

The DAE project information system represents a relatively straight forward approach in implementing a traditional database application. The use of dual French/English language capability, thesaurus, and keyword translation and search facilities significantly adds to the complexity of implementing and maintaining an otherwise simple computer application. Considering the projected community of users of this system, however, the additional costs of implemented this system is reasonable. From past experience, if a computer system is not easy to use and understand by the general staff, is will not be used. The key to success of this project will rely on the donor organizations using and contributing to the database of project information.

Although the SPAAR computer application would be a reasonable choice, the use of a database package, specifically R-BASE 5000, is more advantageous due to its much greater flexibility, ease in programming, user friendly features, and availability of expertise with this package.

Implementation at the local focal points within the various donor agencies will be relatively easy and not require personnel with significant computer knowledge. However, success of this project will require commitment to the use of this system by donor agency project staff. The local focal points should be able to purchase the necessary computer equipment and software for under US 3,500.

The central focal point at the World Bank will have the responsibility of developing this project information system and coordinating its use throughout the donor community. The first six months of this project will require a significant level of effort by the project staff in designing and developing the software and contributing manual system, collecting a survey of data, reviewing implementation plans with the user group, then distributing the final system and overseeing the loading of project data from all of the donor organizations. The computer hardware and software expense at the central focal point should be under US $4700. The personnel expense at the central focal point and at the various donor agencies will need to be estimated by each organization.

APPENDIX A - Suggested Implementation Schedule

The following table suggests an implementation schedule for the DAE project information system. This schedule reflects a system implementation that does not utilize the computer system for a complete data capture activity in the field. Other methods of implementation, which would be just as viable, would require a different schedule of implementation.

Time Frame (Week No.)	Item	Activity
1	1	DAE approval of the project and requisite costs.
1 - 3	2	Recognition of a formal task/user group by the users/agencies.
1 - 2	3	Setup of the central focal point at the World Bank headquarters.
3 - 10	4	Collection of a representative sample of data from user organizations.
2 - 7	5	Functional specification of the system with acceptance review by user group.
4 - 11	6	Initial development of software system.
11	7	Review of the sample data from donor organizations.
12 - 14	8	Modifications to the software system based on review of sample data and user group feedback.
15	9	Testing the system with sample and test data.
16	10	Demonstrating a preview system to task group for functional verification.
16 - 30	11	Full data collection effort from all user organizations.
22 - 32	12	Initial loading of all collected data and compilation of English and French thesaurus and keyword vocabulary.
30 - 33	13	Preparation of system and user manuals and training programmes.
13 - 18	14	Preparation of user facilities, distribution of project information system.
33 - 35	15	Distribute updated system with fully loaded database.
36 - 40	16	Corrections to software and data collected from initial user response.