Miscellaneous Paper ITL-94-1
September 1994

US Army Corps
of Engineers
Waterways Experiment
Station

AD-A285 195

Strategic Environmental Research and Development Program (SERDP) Information Analysis Center Implementation Plan

by *Peggy Wright, David Stinson, Shannon Thornton, Jo Ann Welch*

94-31587

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Prepared for Headquarters, U.S. Army Corps of Engineers

DoD EPA DOE SERDP
Strategic Environmental Research and Development Program
A Partnership to Improve the Environment

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by Peggy Wright, David Stinson, Shannon Thornton, Jo Ann Welch

U.S. Army Corps of Engineers
Waterways Experiment Station
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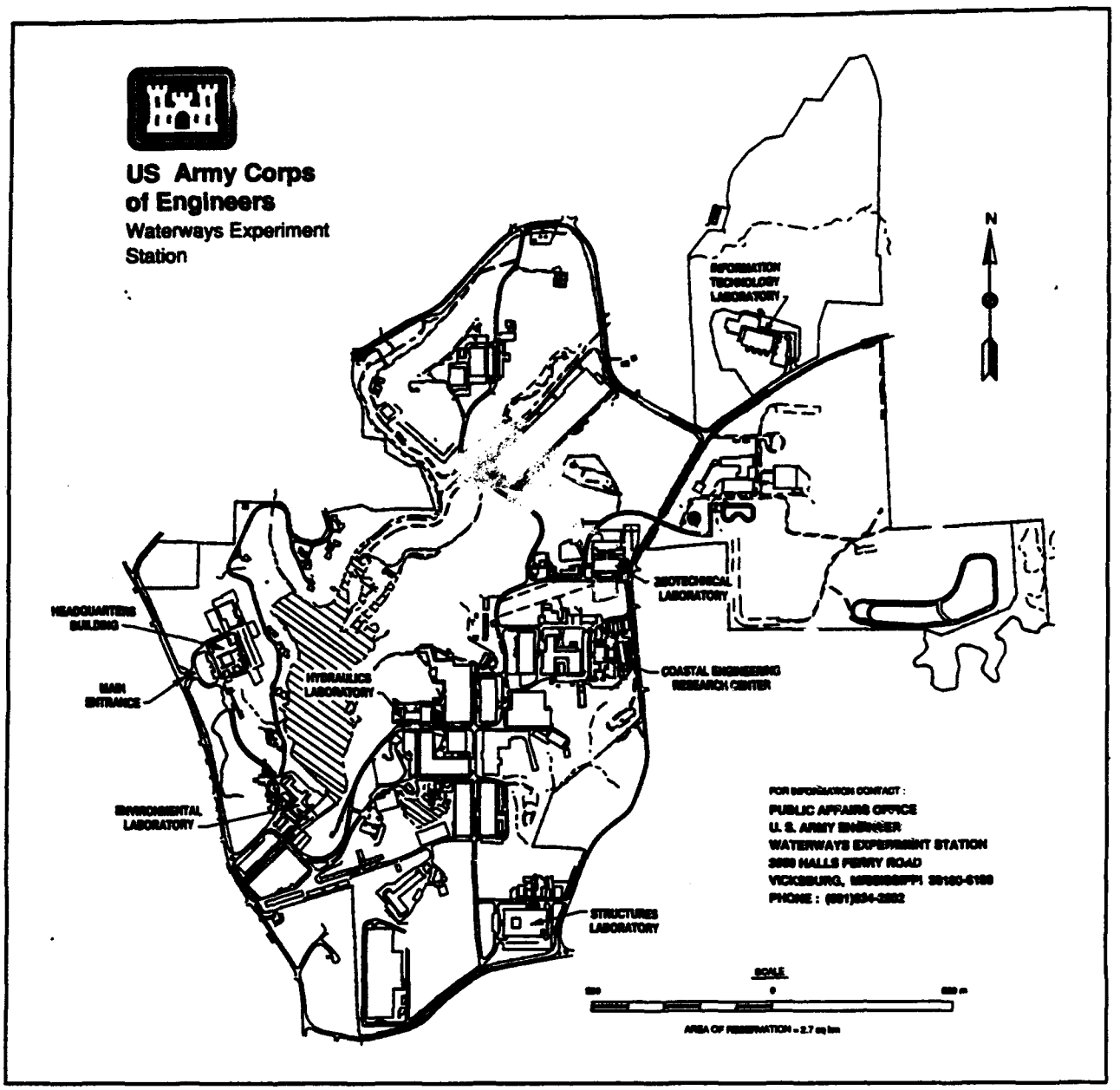
Prepared for U.S. Army Corps of Engineers
Washington, DC 20314-1000



Waterways Experiment Station Cataloging-in-Publication Data

Strategic Environmental Research and Development Program (SERDP), Information Analysis Center implementation plan / by Peggy Wright ... [et al.] ; prepared for U.S. Army Corps of Engineers.

39 p. : ill. ; 28 cm. -- (Miscellaneous paper ; ITL-94-1)

Includes bibliographic references.

1. Strategic Environmental Research and Development Program -- Information services -- Planning. 2. Environmental policy -- Information services -- Planning. 3. Government communication systems -- Planning. 4. Information networks -- Planning. I. Wright, Peggy. II. United States. Army. Corps of Engineers. III. U.S. Army Engineer Waterways Experiment Station. IV. Information Technology Laboratory (US Army Corps of Engineers, Waterways Experiment Station) V. Strategic Environmental Research and Development Program (U.S.) VI. Series: Miscellaneous paper (U.S. Army Engineer Waterways Experiment Station) ; ITL-94-1.

TA7 W34m no.ITL-94-1

SERDP INFORMATION ANALYSIS CENTER
IMPLEMENTATION PLAN

PREFACE

This miscellaneous paper explores the information requirements of the Strategic Environmental Research & Development Program (SERDP) and proposes suitable, contemporary solutions to satisfy these requirements. Information collection and dissemination needs and office automation needs are addressed. Funding for this paper was provided by the SERDP.

This paper was authored by Ms. Peggy Wright, Mr. David Stinson, Mr. Shannon Thornton, and Ms. Jo Ann Welch at the Information Technology Laboratory (ITL), U.S. Army Engineer Waterways Experiment Station (WES). The technical lead and research on information analysis/dissemination were performed by members of the System Modernization Unit, Computer Science Division, ITL. Technical assistance and research on office automation were performed by members of the Customer Assistance Center and Communications Group, both of the Information Management Division, ITL.

Technical guidance, assistance, and/or editing were provided by Mr. Kim Young, Ms. Jennifer Rabert, Mr. Randy Fontan, Mr. Gregory Rottman, Mr. Tom Spencer, Ms. Jamie Leach, Mr. Guy Williams, Dr. Windell Ingram, Ms. Barbara Comes, Mr. Murray Huffman, Ms. Jimmie Perry, Mr. Robert Baylot, and Mr. Hollis Landrum, ITL.

The work was accomplished at WES under the direct supervision of Ms. Barbara Comes, Chief, Systems Modernization Unit; Dr. Windell Ingram, Chief, Computer Science Division; Mr. Dennis Gilman, Chief, Information Center; and Mr. Murray Huffman, Chief, Information Management Division; and under the general supervision of Dr. N. Radhakrishnan, Director, ITL.

At the time of publication of this report, Dr. Robert W. Whalin was Director of WES, and COL Bruce K. Howard, EN, was Commander.

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IMPLEMENTATION PLAN

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SERDP INFORMATION ANALYSIS CENTER
IMPLEMENTATION PLAN

I. PURPOSE: The Strategic Environmental Research & Development Program (SERDP) is a relatively new program appropriated by Congress. A new executive director, Dr. John Harrison, was recently appointed. Dr. Harrison is tasked with establishing an office in the Washington, D.C. area. This study was conducted by the Information Technology Laboratory, Waterways Experiment Station, on his behalf to perform two functions: determine the SERDP information and automation needs, and propose suitable solutions to enhance and strengthen the quality of information used to support and report the SERDP mission.

The first and most urgent need is to determine the office automation (OA) requirements necessary to equip the SERDP executive office. The installation of SERDP OA equipment is scheduled for 4th quarter 1994 in the greater Washington D.C. area. Although the exact location of the SERDP office is not currently known, OA needs and logical schema can be identified, addressed, and acquisition begun. When the final location is determined, interaction with the building coordinators will be necessary to facilitate network connections for the office local area network (LAN) and external (Internet) access.

The second need is for a SERDP Information Analysis Center which will encompass the requirements to collect and disseminate information pertaining to the research and development functions mandated by the program. The SERDP Information Analysis Center should include applications such as a management information system to capture research progress reports, an executive information system to support executive information requirements, a calendar of SERDP events, an online search engine to allow browsing/capture of SERDP-related information, Internet e-mail access, references to other environmental information analysis centers, and an electronic bulletin board system.

The primary goal of this document is to identify information needs and propose effective solutions that can be implemented in a phased approach.

II. SCOPE: In addition to addressing the hardware and software needs required to capture and report SERDP information, this study addresses the office automation needs required to set up and efficiently support the SERDP executive office. Because of its charter, SERDP is a high-visibility project and needs to develop and expand an aggressive environmental information analysis center. Part of this information study's goal is to investigate, identify, and propose methodologies to facilitate SERDP in achieving this desired visibility via the information superhighway.

III. OBJECTIVES: SERDP information objectives encompass office automation, communication, and information collection, analysis, and dissemination. These objectives and their resolution will be addressed throughout this document as the two separate, but overlapping areas, of office automation (OA) and information analysis (IA).

A. Office Automation:

1. Provide a mechanism to originate documents in widely used formats.

2. Provide a means to convert documents from one word processing format to another.

3. Provide a full suite of OA capabilities to support the SERDP mission including word processing, spreadsheet, database, project management, and communication functions.

4. Provide a mechanism for interoffice e-mail and file transfer.

5. Provide a mechanism for intraoffice e-mail and file transfer.

6. Provide an environment that can support the IA mission as well as OA.

7. Provide facsimile capability.

8. Provide a reliable OA work environment.

B. Information Analysis:

1. Provide the necessary tools to capture, store, and retrieve information related to proposals and progress/execution data, and other SERDP data.

2. Provide mechanism to meet internal data requirements. These requirements include data management, executive information, and electronic document filing mechanisms with keyword searching and text retrieval.

3. Provide the means to accomplish effective information dissemination. This information dissemination should address a calendar of SERDP events, Internet e-mail, online text search and retrieval, and a BBS.

IV. REQUIREMENTS: An assessment of operating requirements which will impact the successful achievement of the proposed objectives is provided.

A. Office Automation:

1. All staff members must have a computer workstation.

2. All workstations must have connectivity to either a local shared high speed printer and/or individual printers.

3. Workstations must be able to provide local and wide area communication, word processing, spreadsheet, database, e-mail, and project management capabilities.

4. Software should be flexible so that various data formats can be converted or used in native form.

5. All staff must have access to a facsimile machine.

6. Workstation configurations must be simple to use and maintain and training must be available where required.

7. All equipment must be protected from power sags and spikes, and power outages up to 30 minutes.

8. Hardware, software, and services must be available through existing contracts or competitive procurement.

9. All OA equipment must have at least a 2-year on-site warranty.

B. Information Analysis:

1. All proposed hardware/software solutions must adhere to industry-standard communication protocols.

2. A phased approach should be used to make maximum use of existing resources and ease the transition to the target environment.

3. Proposed solutions should provide maximum flexibility to users to meet unique organizational requirements.

4. All proposed solutions must support and foster connectivity among SERDP community.

V. ASSUMPTIONS: The SERDP office will be established in the greater Washington, D.C. area and will house seven staff members and possibly one or two contractors that support the SERDP mission. An Internet link will be necessary to provide access to SERDP and the outside world. It is assumed that an Internet link can be acquired wherever the SERDP offices are located. The assumptions listed below are made for planning purposes.

A. Office Automation:

1. Furniture will be available to accommodate computer workstations and printers.

2. Either 10Base-T or 10Base-2 ethernet drops will be available for each computer workstation and server. If not available, they will be installed as part of the OA effort.

3. The local ethernet subnet can be used to access the Internet.

4. Contract services will be available to install and maintain equipment and software and provide training if needed.

5. Copiers, typewriters, and OA supplies are not addressed in this plan.

B. Information Analysis:

1. Contract support will be available to maintain the current suite of tools, and participate in design and deployment of proposed IA applications.

2. A Unix host machine running Mosaic server software will be the desired interface with the SERDP community using Mosaic client software. The Mosaic server and client software are available at no cost on Internet.

3. External traffic will access SERDP through a direct Internet link. For those users without direct Internet access, software is available to allow asynchronous access to Internet via a modem. There may or may not be a charge for asynchronous Internet access. External SERDP users will be responsible for locating Internet access.

VI. STRATEGY:

A. Overview of Current Environment

1. Current OA Environment. Previous work on SERDP has been performed out of the existing organizational infrastructure in terms of both personnel and equipment. A service contract with Labat-Anderson has been available to support SERDP work. Beginning in late summer of 1994, a dedicated SERDP staff will be consolidated into a common office space. Therefore, OA requirements for this group are being newly implemented.

2. Current IA Environment. The SERDP support contractor, Labat-Anderson, has developed and maintained a manual system to meet the SERDP IA needs. Proposals and progress documents are normally accepted in a common word processing format and typed into an in-house PC-based database. Windows-based search software is used to index and provide access to the project data. Currently access is limited, i.e. not LAN-based. The need to modernize and automate this process is recognized and these requirements and others are addressed in this plan.

B. Overview of the Target Environment

Several different hardware configuration combinations were considered and researched during the course of this study. Some of the configurations considered and rejected were either entirely PC-based or entirely Unix-based. These configurations were rejected primarily because of personnel orientation and comfort or communications limitations. An entirely PC-based configuration does not handle the external communications/information analysis needs as robustly as a Unix system. An entirely Unix-based configuration would probably not be a "good fit" for most offices because of staff background and computer experience. Due to these considerations, several configurations were considered that use PC-based office solutions

and Unix-based communications/information analysis solutions. The set of possible configurations was further reduced in an effort to present the most efficient and cost-effective solution. Two configuration options are expanded and addressed in detail.

Option 1 considers a peer-to-peer local network based on Windows for Workgroups to address OA needs (see Figure 1). A Unix host machine, also located in the office, would address the information analysis/dissemination requirements. In this configuration, Unix support would be handled by on-site contract support, and space must be available to house the Unix machine and support person.

Option 2 considers a peer-to-peer local network based on Windows for Workgroups to address OA needs (see Figure 2). A remotely located Unix host machine would address the information analysis/dissemination requirements. In this configuration, Unix access and support would be on a pay-for-access basis, thus saving initial acquisition costs of the Unix hardware and software. This would save not only acquisition costs, but would also reduce the number of support personnel required in the SERDP office by at least one.

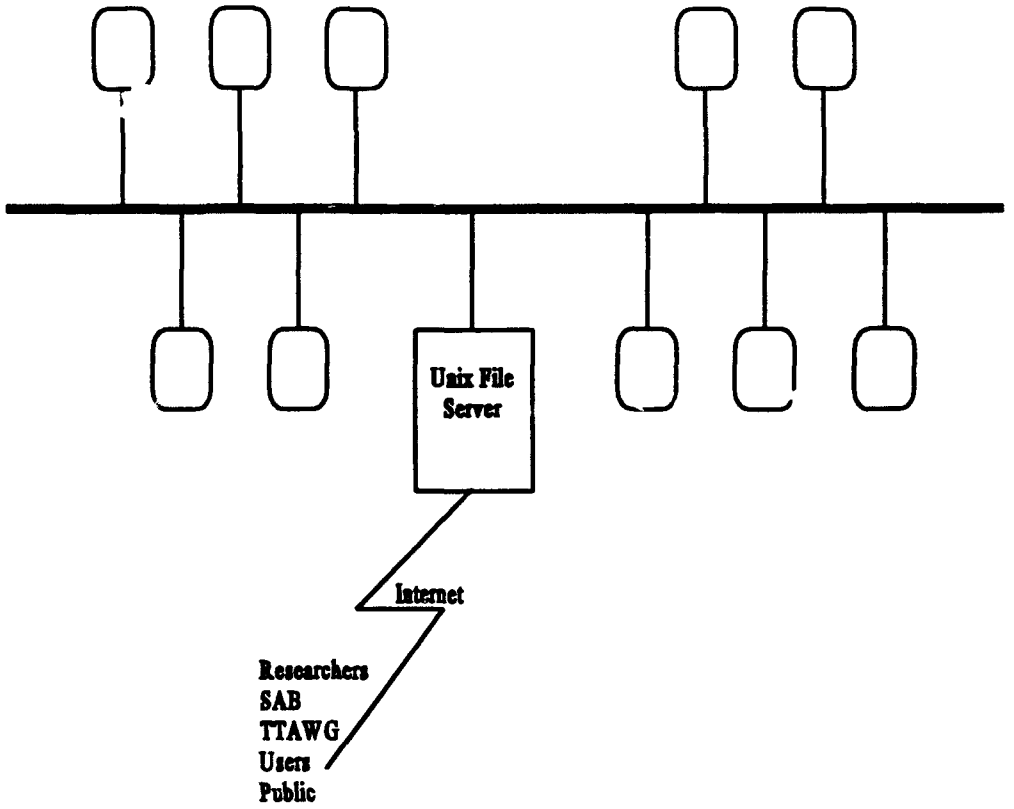
Both options require a dedicated PC (which is always powered up) to serve as an e-mail repository. A dedicated PC, which is always on, ensures that no mail is lost because it cannot be delivered to a PC that is off. This solution is less expensive in terms of acquisition, administration, and maintenance than purchasing a PC-based file server with a conventional network operating system, such as Novell, and LAN-based software. Additionally, it provides software redundancy and reliability because each PC is self-sufficient and does not rely on a server to provide OA software.

Before a conclusion can be reached on which option best meets SERDP needs, consideration must be given to the urgency of housing the SERDP IA host machine locally. Part of this consideration is a comfort factor, and should be an executive decision based on supporting evidence of the personnel affected. Consider leaving the SERDP options open. SERDP can obtain remote Unix access/support quickly and with less expense. Negotiate Unix access initially to begin implementation and thus allow time for acquisition in FY95 for a locally owned and operated machine if SERDP needs dictate. Acquisition costs for these options are discussed in Appendix B.

It is recommended that option 2 be implemented initially and the effectiveness of remote access can be evaluated at a later date. If it is ultimately desired to implement option 1, the acquisition process and expense can be covered in the next fiscal year. This solution provides a nice fit to meet the SERDP requirement to begin a phased implementation.

Option 1

Figure 1. Peer-to-Peer LAN with local Unix File Server



Office:
High-end PCs
Windows environment only
- WordPerfect v6.0
- Microsoft Office Prof.
- Microsoft Project
- Windows for Workgroups
- SMTP-compliant E-mail

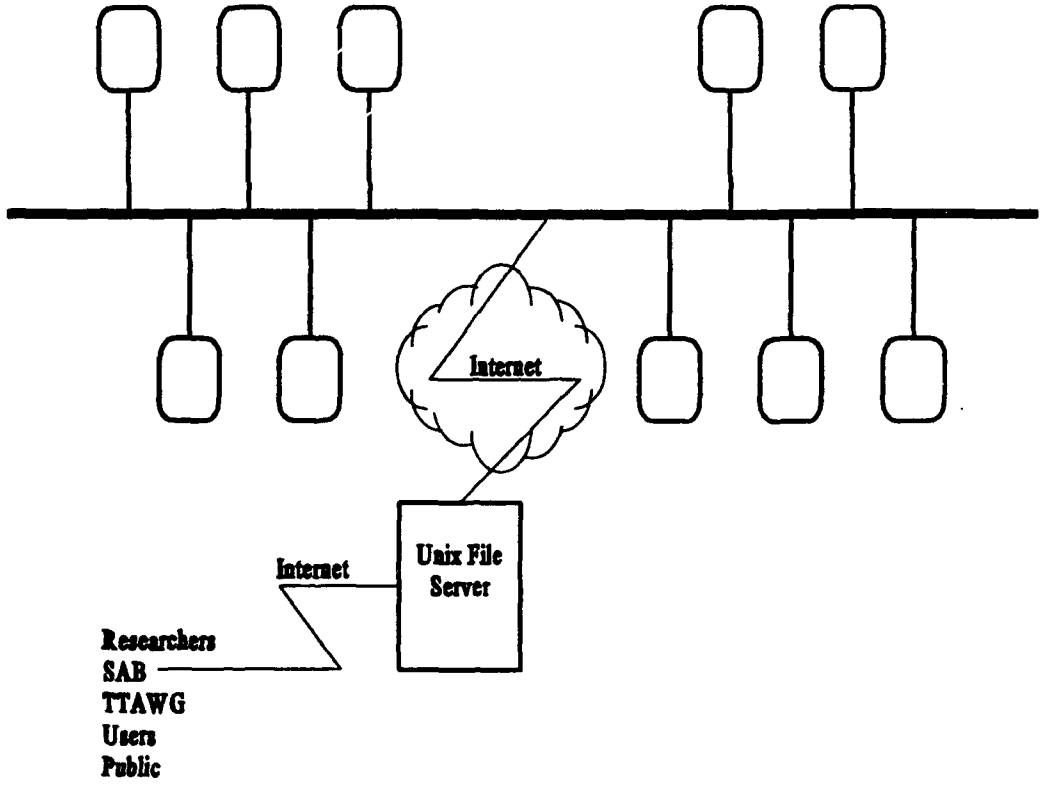
TCP/IP

Advantages:
Shared disk space on Unix
Server on-site
Minimal PC/LAN maintenance
Each PC self-contained
Individual or shared printers

Disadvantages:
Buy server
Buy software
Operating expense
- Train/Pay Unix support personnel
- Office space for Unix box/personnel

Option 2

Figure 2. Peer-to-Peer LAN with remote Unix File Server



Office:
High-end PCs
Windows environment only
- WordPerfect v6.0
- Microsoft Office Prof.
- Microsoft Project
- Windows for Workgroups
- SMTP-Compliant E-mail

TCP/IP

Advantages:
Lease Unix & DBMS services
No on-site Unix operation expense
More cost-effective
Minimal PC/LAN maintenance
Each PC self-contained
Individual or shared printers

Disadvantages:
Remote data access

1. Target OA Environment

To provide maximum productivity, each staff member will have access to their own personal computer workstation. Workstations will be running Windows for Workgroups over DOS 6.XX. Every workstation will have connectivity to a centrally located high-speed laser printer and optionally a low-end color printer for presentation graphics. The purchase of at least one additional comparable printer is advised as a backup measure should the shared printer be out of service. Workstations will have peer-to-peer access to other workstations for disk and printer sharing and to the Internet via a local 10Base-T or 10Base-2 connection. For speed and redundancy, each PC will be equipped with its own Windows-based software for ethernet connectivity, e-mail, word processing, spreadsheets, databases, and project management. Tape units are recommended on each workstation to provide a backup capability for data files. Additional backup can be provided by using disk storage space on the e-mail repository machine. Files can be compressed, transferred over the network, and stored in individual protected directories on the e-mail repository machine. A centrally located plain-paper facsimile will be available. Power filtering and auxiliary power supplies will be connected to all equipment to minimize downtime and provide a minimum 30-minute grace period in case of power failure. Virus protection will be provided using native DOS/Windows tools.

2. Target IA Environment

a. Background

Labat-Anderson and Mr. Mark Graves provided most of the vision of what was needed for a SERDP Information Analysis Center. Labat-Anderson has more experience with the SERDP program and specifically the SERDP data requirements, as they have managed the data requirements. An information analysis vision from a white paper prepared by Labat-Anderson was used as a point of reference when researching needs and designing the SERDP Information Analysis Center. A vision of a Mosaic interface (see Figure 3) was investigated to determine the applicability and cost-effectiveness of implementation. The SERDP information requirements can be met by using a Mosaic interface[1] which is easily accessible through the Internet. As an introduction to the types of functions required to achieve the SERDP information analysis/dissemination vision, consider the following scenarios:

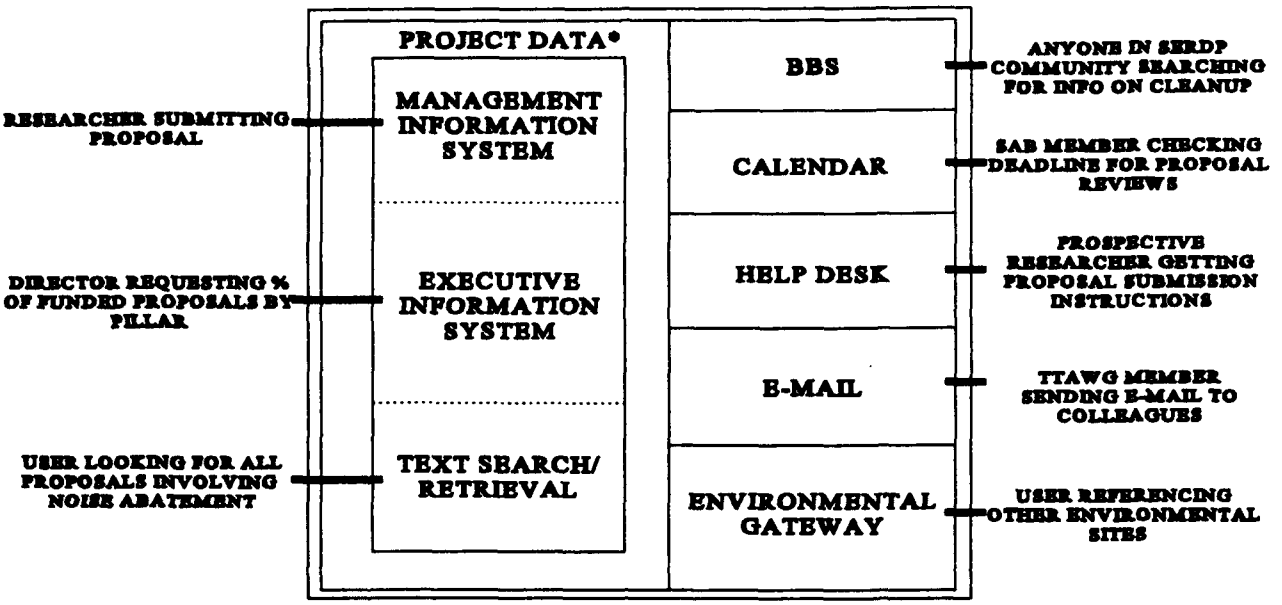
Scenario #1

Scenario:

A professor at a university wishes to look into on-going research involving the problems created by the noise around airports and the effects on the environment. The professor uses Mosaic from the PC in his office to connect to the SERDP server. The SERDP home page appears with a directory describing the other pages available. The professor visits the Help Desk, a page available on the system, to see what tools and functions are available.

[1] Mosaic is one graphical user interface that allows access to the World-Wide Web. As part of this effort, World-Wide Web was researched and these findings are included as Appendix C of this document.

Figure 3. SERDP INFORMATION ANALYSIS CENTER
INTERNET ACCESS VIA MOSAIC INTERFACE



*Project data consists of proposals, progress reports, project execution data and other project-related documentation.

He discovers that there is a page for performing keyword searches on existing and previous proposals. The professor clicks on the keyword page reference and is prompted for the text he wishes to search for and which documents to search, such as current funded, current rejected, previous funded, and previous rejected. He chooses the "All" option. The professor enters "noise" and clicks on the start search button. A few seconds elapse, and he sees a list of proposals containing references to noise and the piece of text in which the word was used. He clicks on one reference that talks about the effects of noise around Army bases on the gnatcatcher.

The proposal for that research is pulled up. The professor reads through and decides that his research is related but would address a different set of problems. He decides he would like to create a proposal to submit. He clicks on the icon to return him to the SERDP home page. He again clicks on the Help Desk. He finds a reference to information on creating and submitting proposals. He clicks on this reference and reads through the instructions for creating a proposal and submitting it for review. He then needs to find out when the next group of proposals will be reviewed, so he clicks on the icon for the SERDP calendar. He sees a list of major SERDP events and deadlines. One of the events contains the deadline for the calls for proposals.

<u>Behind the Scenes</u>:
When the professor entered his keyword to search for "noise" and started the search, the system script searched the directories for current FY proposals, rejected and funded, and

prior FY proposals, rejected and funded, on the SERDP server. These directories would include:

/proposals/93/rejected
/proposals/93/funded
/proposals/94/rejected
/proposals/94/funded

As the script located a document, in ASCII format, that contained the keyword, it would display the document name and the paragraph that contained the keyword. When the professor clicked on the document he wanted to see, the script would display the entire document with a header showing who submitted the proposal, the year it was submitted, and whether it was rejected or funded.

When the professor clicked on the calendar, a flat file or database table was searched for major events. The major events and a twelve-month calendar are shown. Since the proposal deadline was a major event, the professor did not need to look further. However, from the twelve-month calendar, a single month may be selected to see daily events, both major and minor. This would be available for the current year. A field on the calendar page would allow the professor to change the calendar year he is viewing. The script on the server performing the table or file lookups would default to the current year or use selected year and month.

Scenario #2

Scenario:

The professor's proposal, described in scenario 1, has been funded. He is ready to submit his first quarterly progress report. He goes to the Help Desk to find out how to submit quarterly progress reports. He clicks on the reference and is prompted for his proposal password. This password authenticates the user to prevent the general public from manipulating proposals.

After the system verifies the password, the professor sees a form appear with the project title from his proposal. There are also entry fields for the date completed, agency, lab, concerns/issues, date funds received by principal investigator, etc. There is a button labeled "Milestones..." for the professor to enter his quarterly milestones. After he's finished entering his information, the professor clicks on the "Submit" button to officially file the quarterly progress report. He is returned to a screen where he can submit other project tracking information.

The professor would also like to enter his monthly fiscal summaries. He clicks on the reference for submitting his monthly figures. He sees a form appear with his project title and is prompted to enter the date completed, total allocated funds, in-house dollars, out-of-house dollars, etc. The professor enters this information and clicks on "Submit" button.

Behind the Scenes:
Once the professor chooses to enter information concerning his funded proposal, he is prompted for a password. This password can either be assigned or entered by the user, depending on how the proposal was originally submitted. After the password is entered, a script on the SERDP server searches for the password in the user validation file. Once found, it points at a proposal id. The proposal's header information, such as id, date submitted, and project title, are displayed with some options for project tracking. Once he chooses quarterly reports, an entry screen is displayed along with the same header information. After he submits the quarterly report, the data is saved under his pro id. Until the professor exits this portion of the system, he may continue to submit add project tracking data under his project title.

*Storing data may involve either running an SQL script or Pro*C program to save the data in an Oracle database or running a C program to save the data in a flat file. The details are transparent to the user and could be changed at any time with no noticeable effects on the user (i.e., if flat files are chosen initially and then a database management system (DBMS) s decided on at a later time).*

Submitting proposals could also be handled in this manner if a standard format is agreed upon. The various sections of the proposal would be fields on the Mosaic form. The password could then be entered by the user for iterative updates to the proposal before it is actually submitted. This scheme is desirable because it eliminates formatting and submitting inconsistencies.

b. Areas of Consideration
The concept of security is touched upon in the preceding scenarios. Although SERDP needs to disseminate information to the public on a read-only basis, researchers, the advisory board, and others will require write access. During research of the tools and functions described next, security was considered an inseparable part of each application. The development/deployment team must ensure security as the individual functions come online and are integrated into the SERDP Information Analysis Center.

Some of the functions necessary to achieve the SERDP Information Analysis Center were considered in the scenarios given. The individual function areas include proposals, project tracking, electronic document management system (EDMS), text/search retrieval, instructional information, newsletters and publications, calendar of SERDP events, bulletin board system (BBS), and an executive information system (EIS). Needs, alternatives, and recommendations are considered for all of these functions. Most of these applications would be bundled into a Mosaic interface which is easily accessible through the Internet.

SERDP INFORMATION ANALYSIS CENTER
IMPLEMENTATION PLAN

1. Proposals

Needs:

Last year there were 1300 SERDP proposals. Of the 1300, Labat-Anderson received 700 and entered these into the project tracking system. SERDP administration decided to fund 130 proposals. Next year the number of proposals submitted, reviewed, and accepted should be lower because of the multi-year funding awarded to some funded projects. However, there is a need to maintain prior proposals, both accepted and rejected, as well as current proposals. All of the proposals should be available to the keyword search and text retrieval system for project managers, staff, researchers, and others to review. Thus, allowing for growth, a conservative estimate is that 2000 documents may need to be available online.

Alternatives:

There are two areas to be addressed concerning proposals: submitting and data storage.

Submitting:

1. The current method for submitting proposals could still be used. The user enters the proposal into a word processor, such as WordPerfect, and sends a diskette to the SERDP office. This approach could be acceptable if the standards agreed upon by the SERDP office are followed.

2. Since the users are accustomed to entering their proposals into a word processor and submitting the electronic document, anonymous FTP could be used to transfer the document. If the SERDP server was equipped to support anonymous FTP and a specific directory was established for submitting proposals, the binary documents could be transferred directly, thus reducing time and costs associated with submitting by diskette. This method requires that users have FTP capability.

3. An entry screen designed in Mosaic could be used to submit proposals. This approach has the advantage of forcing the users to follow a standard format. However, it also requires that the users enter their proposal through Mosaic, which is not quite as friendly as a word processor for entering large amounts of text.

4. A system could be developed in Microsoft Access or FoxPro for entering proposals. The software could be made available from a Web page, anonymous FTP, or a BBS. The user would pull the software down and enter the proposal information. Once complete, the proposal data could either be saved to diskette or transfered via FTP to the SERDP server.

Data Storage:

1. Proposal documents could be entered into a DBMS for storage, which would allow queries on certain properties of the documents. However, this requires that the keyword search and text retrieval software be able to access the documents in the native database format. It also requires the purchase of a DBMS. Depending on how

documents are submitted, this approach may also require that the documents be imported into the DBMS. Importing documents requires programming effort but it is better than the current approach of retyping data.

2. Document filing software could be purchased to manage the documents. This software could include the ability to perform keyword search and text retrieval. This software must be drivable from the command line or scripts to allow Mosaic users to have the ability to perform keyword searches. As with the previous alternative, some importing of documents may be necessary.

3. Proposals could also be stored in ASCII format. This alternative requires no additional purchases, and the documents could be keyword searched and retrieved using scripts and standard system commands. This approach would require some naming conventions for storing the documents to distinguish prior year proposals from the current. For Mosaic users, the ASCII approach is much more robust because the documents would require little or no formatting for display.

Recommendations:
The most robust solution to allow users to submit proposals is to implement a Mosaic form to prompt for the various sections of a proposal. This approach is very desirable because the final format of the document is transparent to the user. However, the form should allow the user to enter the proposal in increments; thus, it would not require the entire proposal to be entered at one time. Instead, it would allow the user to save the proposal for future access so revisions could be made. Once the document is complete, the user could submit the proposal automatically.

If this approach inconveniences the user, anonymous FTP appears to be the next best solution. The problems associated with anonymous FTP are the same as those associated with sending diskettes. The document may not be in a compatible electronic format nor may it be in the standard layout. To resolve these problems would require a template for the users to follow and a standard document format such as WordPerfect v5.1 or Microsoft Word v6.0.

Once proposals reach the SERDP server, they must be in an ASCII format for easy display to the users. Additional formats such as WordPerfect or Microsoft Word could also be stored, if desired, to allow users to pull back the documents for printing at their own site. Until appropriate electronic document filing software (discussed separately) is implemented, purchasing software to manage the documents would not be feasible. Initially, the documents should be stored in separate ASCII files, and if feasible, software purchased to automate and simplify the process. This approach appears to be the most cost-effective. It would require approximately one-two weeks to design a filing convention and produce scripts for searching and retrieving proposals based on user requests. These scripts would be compatible with the Mosaic interface.

2. Project Tracking

Needs:

SERDP currently funds over 130 projects. That number will grow over the next few years. For proper management of these projects and timely response to Congressional or other inquiries, it is imperative that project information be completely automated and online. Filing of quarterly progress reports and monthly execution data should also be automated.

Alternatives:

The project tracking needs described above can be broken down into two categories: Data Storage and User Interface.

Data Storage:

1. Labat-Anderson currently uses the project tracking system (PTS), written in FoxPro, to maintain project data. This in-house software could be modified to use as a distributed application where each user would obtain a copy and enter their project data. This data would then have to be submitted to the main office where it would be consolidated and made available for reporting and queries. This approach would require extensive modifications to the existing system.

2. Flat files on the server could be used to hold all of the project data. Relationships among the data could not easily be explored with this approach. However, it is painless to set up, requires little cost, and data can easily be imported into a DBMS for future growth or current reporting.

3. Purchase or access a DBMS, such as Oracle or Informix, to house the project data. While the DBMS provides a more stable and flexible way of accessing the data, it increases the amount of support necessary on the server because a database administrator would be necessary. A DBMS also increases initial startup and maintenance expenses.

User Interface:

1. The researchers could use Labat-Anderson's PTS or a similarly designed system to enter monthly execution data and quarterly reports. However, PTS is not currently designed to be used as a distributed application and would require design modification and development time to make it so. If new features were added to a distributed software, new versions would have to be provided to users.

2. Mosaic entry screens could be created to prompt researchers for their project data. This would provide a consistent interface for users since Mosaic appears the interface of choice for access to the SERDP documentation. This approach requires development time to produce scripts to extract the information, store it, and produce reports. However, unlike alternative one, as new features are added, there is no need

to distribute new software to the users because the Web documents are stored centrally, and the development time is less.

Recommendation:
Functional data requirements need to be collected and data modelling initiated to determine the appropriate methodology to meet SERDP requirements most effectively. Initially, the data storage could be implemented using the flat file scheme suggested in alternative two to meet all of the project tracking needs. As program requirements are discovered and the volume grows, an online DBMS may be desired. Until then, a flat file scheme would be more cost-effective and simpler to implement, requiring about two to three weeks of development time. Another advantage of using the flat file schema initially is the ease of growth and conversion. Data stored in this manner can easily be imported into a DBMS, including a PC-based DBMS. This allows the SERDP executive staff much latitude in data manipulation. Once this data is in a local database, the data is easily shared among a suite of OA tools such as spreadsheets, word processors, and presentation software.

Regardless of the data storage, a Mosaic entry screen should be used as the interface for collecting the project data. PTS, the current FoxPro system, is not designed for end-users. Instead, the data should be collected through a Web page and then initially backloaded into the PTS, until a replacement data management system is implemented.

3. Electronic Document Management System (EDMS)
The electronic document management function impacts data collection (proposals, project tracking) and text search/retrieval. Although each of these areas is addressed in detail separately, EDMS is addressed here because it may be desirable to incorporate all of these needs under this area.

Needs:
SERDP project data currently consist primarily of proposals, progress reports, and execution data in addition to prepared reports. The information management needs for SERDP consist of the need to collect, manipulate, and report project data. This function is currently being addressed for internal use only with the following tools:

(1) WordPerfect documents,
(2) PTS, an in-house Foxpro database system, and
(3) ISYS, a PC-based text search engine.

There is currently little automated integration of these tools. The target solution is an integration of tools such as an EDMS and a DBMS with internal and external access. Unfortunately these solutions are typically expensive, particularly if implemented on a Unix system. The Unix system is needed to maintain Internet access. It comprises a self-contained central repository for SERDP information. A Mosaic interface is desired for public access due to ease of implementation and cost-effectiveness.

Alternatives:

1. Purchase an EDMS system designed to support Mosaic, such as WAISgate (Wide Area Information Server Gateway $15K) or PLServer ($10K annually) and implement with current data. Additionally a DBMS needs to be leased or purchased and a database developed to completely address the need.

2. Use Unix and freeware utilities for external data access/transfer and maintain use of the current methodologies internally.

Recommendations:

The most expedient and cost-effective solution is to begin implementation of the Mosaic interface using Unix OS and freeware utilities for external data access/transfer, while using the current methods internally. A parallel process is needed to determine functional data requirements with the goal of designing the SERDP data model and identifying the proper set of integrated tools for universal access.

4. Text Search/Retrieval

Needs:

The SERDP office is frequently faced with Congressional or other inquiries for work being done on a particular topic or involving some specific issue. Currently, the SERDP personnel get Labat-Anderson to search the funded and unfunded proposals for information to satisfy the request. It is vital that this capability be automated so SERDP management can perform their own searches. For requests issued by others, perhaps a researcher looking for related work, the search should be available online.

Alternatives:

1. Continue to allow Labat-Anderson to handle these requests. Labat-Anderson is using a software package called ISYS to perform keyword searches. The ISYS software requires that the proposals be located in a PC-based environment. ISYS may be run with DOS emulation software (PCNFS) on a Unix machine, but is not command-line addressable. This means that ISYS will not work for external Mosaic access.

2. Since the proposals will be stored on the SERDP server and this machine will probably be a Unix system, software similar to ISYS could be located for Unix. A possible candidate is the Personal Librarian available from Personal Library Software. To allow users to access this keyword search and text retrieval ability through the client Mosaic interface, this software must be script driven (i.e., cannot be interactive directly with the user). Any parameters specified by the user must be submitted to the software through command line, environment variables, or input file.

3. The keyword search and text retrieval could be handled through standard operating system utilities. This necessitates that the proposals and any other searchable documents be stored in ASCII format. However, as addressed previously while

considering proposal storage, this will most likely be the case because the proposals should be viewable through Mosaic, and Mosaic can only display ASCII or hypertext markup language documents.

Recommendations:
The most cost-effective solution is to continue allowing Labat-Anderson to handle keyword search requests, but this alternative is not acceptable because it does not give the keyword search capability to the users. Locating Unix-based commercially available software that will accomplish the many facets of keyword search and text retrieval is desirable. However, commercially available software is usually expensive, requires maintenance, and may introduce data security issues. The recommended approach, at least initially, is to use operating system functions or freeware utilities to implement the keyword search and continue to use the ISYS internally. While this option may not give as much flexibility as using third-party software, it is less expensive, potentially more secure, and provides a sensible solution. Refer to the related discussion on EDMS software for other potential solutions.

5. Instructional Information (Help Desk)
Needs:
The main SERDP office needs an automated Help Desk, a method of disseminating general information about current SERDP work, background SERDP information, and guidance about submitting proposals, quarterly reports, and monthly execution data. This information should be easily available to everyone including those not directly associated with SERDP.

Alternatives:
1. This Help Desk information could easily be setup as Web pages stored on the SERDP server. These pages would be accessible from the SERDP home page. Anyone interested could access the help information without direct communication with the SERDP office. As the information is changed or updated, the Web pages are updated only on the server.

2. Instructional information could be facsimiled or mailed to individuals separately. This would require more effort on the SERDP office as well as the individuals receiving the information. Any updates or changes would have to be re-distributed to each person.

Recommendations:
The most cost-effective, robust, and consistent solution is to use the first alternative to build a SERDP Help Desk. Any mission-critical information that must be disseminated immediately should be facsimilied or mailed directly to all persons involved; however, for general guidance and background information, the data could easily be kept online for anyone interested to view. Depending on the availability of instructional text, developing Web pages to achieve this would require less than a week's time. Minimal maintenance will be required

as help text is modified or added. It would be helpful to include references (links) to the SERDP Help Desk on the BBS.

6. Newsletters and Publications

Needs:

SERDP personnel have expressed a need to disseminate a quarterly newsletter and other publications to the SERDP community or other environmental interests. Since it is impossible to determine everyone who would want access to such publications, it should be made available to the public.

Alternatives:

1. The newsletter and other publications could be stored electronically on the SERDP server and made available as Web pages to the Mosaic clients. For users wishing to get a hard copy of the publication, it could either be stored in WordPerfect, Word, or other popular word processing formats to be pulled down or downloaded and converted to the desired format by the user.

2. A mailing list could be created and maintained, and newsletters and publications could be mailed to everyone on the mailing list. The list would have to be maintained and requires additional effort and expense to mail the publications.

3. An automated electronic mail list could be maintained, with online subscription services available through a Web page.

Recommendations:

A combination of the first and last alternative is recommended. It is much more cost-effective and timely to use the World-Wide Web and Mosaic to disseminate newsletters and other publications. It requires only a few minutes to make a document Mosaic readable, while it would take several days to print and mail out the newsletters manually. In addition to making the Newsletter available online, it can be automatically sent to subscribers via e-mail and referenced on the BBS.

7. Calendar of Events

Needs:

SERDP needs a central calendar for scheduling group meetings and establishing deadlines. This calendar must be provided to everyone involved, and should be easily maintainable. For example, after several members of a pillar have agreed on a time and place to meet and prepare for an upcoming review, they could add an event to the central calendar, and that event would be reflected immediately.

Alternatives:

1. Provide a Web page for submitting events and viewing the SERDP calendar. The user would be presented with a calendar. When the user clicks on a particular day or

month, the events for that day or month are displayed. Pillar chairs that want to schedule a meeting could add that event to a particular day or group of days.

2. Individual pillar chairs could handle the scheduling of their meetings and review independently of other pillar chairs. Likewise, deadlines could be issued by phone, mail, or electronic mail. This approach requires no extra involvement by the SERDP office, but also does not provide a consolidated view of SERDP events.

Recommendations:
If there is enough volume of information to merit keeping a central SERDP calendar, then the first alternative is clearly superior. If meetings and reviews happen only once or twice a year and critical deadlines are rare, there is no need to develop a calendar interface. Development of a Web-based central calendar would require only one or two weeks. Additionally, an automatic subscription service is recommended to send updated calendars to SERDP advisory board and working groups.

8. Bulletin Board System (BBS)
Needs:
SERDP needs an online information dissemination method to educate the public and particularly the environmental community, about its mission and work. Bulletin boards are widely used by government and academia. Some BBS capabilities include mailing lists, subject area forums, publication access for text searching and retrieval, subject area references, and calendars.

Alternatives:
1. Develop a BBS using off-the-shelf software. Depending on experience, initial development would take about three to four months.

2. DOD sponsors an official environmental BBS, the Defense Environmental Network and Information eXchange (DENIX), that is maintained under DECIM. DENIX is maintained as a DOD resource and is open to anyone in the environmental community for a full range of information dissemination activities. Mr. Cal Corbin, U.S. Army Construction Engineering Research Laboratory, was enthusiastic about supporting the SERDP BBS needs under DECIM.

Recommendations:
Contact the project office to request that a SERDP subject area be established on the DENIX BBS. The BBS is maintained by University Illinois at Urbana-Champaign (UIUC), which has well-known resources and talents. Some coordination between UIUC and the SERDP team will be required, but the rewards should be almost immediate. If DENIX is used as a free resource to provide the SERDP BBS needs, there is no significant time or cost to develop a BBS and minimal maintenance effort (data must be kept up-to-date).

9. Executive Information System (EIS)

Needs:

It is projected that the SERDP executive director and program managers will need to analyze SERDP projects in a manner unlike the individual project manager, technical advisors, or others. This need includes the ability to graph trends and total dollars by pillar for instance, and should also include the ability to pull data into a spreadsheet. Requirements for an EIS will not be well defined until the SERDP executive office and personnel are established and operational. Data usage patterns will develop over a period of time, and EIS functions and requirements can be identified. The EIS should be built over the target SERDP database.

Alternatives:

1. Develop the EIS on the same hardware/software platform as the database.

2. Develop the EIS in an integrated Windows environment using such tools as Microsoft Access, Excel and Visual Basic. Access to the SERDP database could be achieved remotely, or the data imported to the PC environment.

Recommendations:

Because of the relative newness of the SERDP, the EIS is one of the information needs that should be phased in. EIS requirements will be developed over time as the SERDP executive staff usage dictates. The most cost-effective solution in terms of development and expense is second alternative. The Windows environment is rich with the tools necessary to share database files in a seamless and efficient manner. If a standard DBMS[2] exists that contains SERDP data, it is technically simple to make the necessary connections required to retrieve EIS type data. If the data exists in a flat file format, it could still be imported into tables for access by the EIS.

C. Conclusions

1. Data Management Needs: The project proposals and project tracking data make up the core of the SERDP data and are currently stored in a variety of formats. SERDP project data needs to be organized and managed in a more accessible format. The SERDP proposal process of submission, review, approval, acceptance, and tracking needs automating. SERDP *needs* an effective data management system. The data management tools can be PC-based or Unix-based or some combination thereof. How the data is used and who uses the data determines the manner in which it should be organized.

A diagram of the SERDP process recently developed by Labat-Anderson, serves as a good starting point in identifying automation needs, but in-depth interviews with the executive support staff and input from representative members of the SERDP community are needed before a final determination of specific tools is made. Buying software will not automate the

[2] Standard implies open database connectivity (ODBC) a normal criterion of mainstream DBMS products.

SERDP process. More information is required to determine how the SERDP data will be used and all the data accesses. This information is required before a technically sound recommendation can be made to identify the specific tools needed to implement data management. Process modelling or validation of the existing process model is required prior to data modelling. Process modelling, if required, and data modelling are strongly advocated as necessary steps towards making the necessary determinations.

2. Support Staff: This document identifies SERDP information needs and suggests implementation solutions. Support is required to maintain these solutions. An OA support person, with Windows environment experience, should be available on an as-needed basis to maintain the e-mail post office and assist executive staff with automation needs. The level of effort currently required to maintain the SERDP project tracking data will not decrease significantly until the process is automated. Once the process is automated one person should be comfortable handling data administration duties. Maintenance of the IA center functions such as the Help Desk, Newsletters, Calendar, BBS data, and the Mosaic pages will require Unix experience. If the Unix host machine is purchased, a Unix system administrator will be needed. A database administrator for a DBMS such as Oracle may be required. Support personnel requirements are summarized below:

OA support	0.5 persons
Data admin	1.0 persons
IA support	0.5 persons
Unix admin	0.5 persons
Database admin	0.5 persons

Although the level of personnel expertise and additional duties may impact this estimation, recommended minimal support staff level is two people. As shown above, one additional person may be needed for Unix and database administration support depending on implementation solutions.

3. Implementation Recommendations: The following steps should be followed to begin rapid implementation of the SERDP Information Analysis Center.

a. Concentrate on acquiring and setting up the OA environment as soon as possible. The OA acquisition plan is addressed in Appendix A.

b. Survey target office space, and order and install internal and external network connectivity.

c. Begin data modelling and investigation into electronic document filing concurrently as these functions can be considered complementary.

d. Lease or acquire services on a Unix host initially. This may well prove to be the most cost-effective and the most comfortable fit. After an initial trial period, it will be easier to ascertain the necessity of having the Unix host machine on-site. If having the machine on-site is more desirable from a program standpoint, this option will fill the interim requirements until a Unix machine and required software can be acquired and set up. Lease and acquisition information on the desired Unix configuration is addressed in Appendix B.

e. Begin immediate development of a Mosaic interface with a rapid but phased deployment. Rapid and partial deployment will enable early feedback, thus protecting investment.

f. Contact Ms. Connie Watts to officially request BBS support from Defense Environmental Network and Information eXchange (DENIX). Ms. Watts is the DECIM proponent for DENIX, and she may be reached at the DECIM Program Office at 703-325-2334. DENIX is the official DOD BBS for Environmental Information. DENIX provides online environmental information, text search/retrieval, file transfer, e-mail, gateway to other environmental sites, online conferencing, and managed discussion forums in several subject areas, including the environmental quality pillars. The DECIM effort provides funding to maintain and operate the DENIX BBS.

g. Conduct a survey to determine actual number/percentage of SERDP community that currently has Internet access.[3] This survey should identify what type of involvement the user has with SERDP, e.g. researcher, TTAWG member, etc. This information is critical in implementing the SERDP Information Analysis Center, as it will identify needs for alternative access, such as high speed modem on user's side with software residing on the user's machine to provide SLIP access to Mosaic/Internet.

D. Phased Implementation Approach: A phased approach is given below that outlines objectives to be achieved during each phase. The time frames given are best-guess based on current information and may vary depending on requirements and resource availability. The currently used methods of collecting/disseminating data should be maintained and phased into the new methods as time and development permits, thus ensuring a smooth implementation and no loss of project data.

1. OA Implementation:

Phase I (start - 3 months)

a. Prepare IM approval documents and obtain approvals
b. Purchase and receive basic OA hardware and software
c. Inspect building to lay out ethernet taps
d. Cut order to building communications authority or contractor for required cabling

[3] Recent statistics for DENIX BBS indicate 10% Internet traffic and 90% modem traffic.

Phase II (3 - 4 months from start)
- a. Install and configure OA hardware/software
- b. Test all OA equipment and software

Phase III (4 - 6 months from start)
- a. Work out bugs in OA equipment and software installations
- b. Turn maintenance over to on-site contractor

Phase IV (6 months + from start)
- a. OA maintenance phase

2. IA Implementation:

Phase I (start - 3 months)
- a. Acquire necessary access to services on a Unix machine
- b. Begin process modelling and data modelling
- c. Design MOSAIC interface, begin development
- d. Set up BBS (DENIX support)

Phase II (3 - 6 months from start)
- a. Determine feasibility of maintaining remote Unix access vs. local access/maintenance
- b. Complete database design
- c. Implement MOSAIC interface
- d. Continue to expand BBS functions

Phase III (6 -9 months from start)
- a. Acquire Unix platform hardware/software if desired
- b. Begin database development and test
- c. Expand and tune MOSAIC interface
- d. Maintain BBS functions

Phase IV (9 months - 1 year from start)
- a. Move Unix remote application to local machine if desired
- b. Complete initial database testing
- c. Expand and tune MOSAIC interface
- d. Maintain BBS functions

Phase V (1 - 2 years from start)

Implement database at the beginning of this phase. During this period most identified functions will be in a maintenance phase although a normal evolution/enhancement is expected and desired. Early in this period a pattern of executive information usage should become apparent and rapid prototype development of an EIS will be most effective.

Appendix A. Office Automation Acquisition Plan

1. HARDWARE

Listed below are the recommended hardware configurations for the SERDP Office. These configurations or equivalent are needed to meet the SERDP automation requirements. Estimated costs for the recommended configuration of 7 workstations and an e-mail repository/shared file system is approximately $45K.

Low-end workstation:

486DX, 33 MHz	ISA bus
8 MB RAM (expandable)	Intel Chip
300+ MB hard drive	UPS
5-1/4" and 3-1/2" high density floppies	DOS 6.xx
15" SVGA monitor	On-site service (2 yrs)
Local bus video	
Cache	
16 bit network card	

Vendors Considered: Price Range: $2,100 to $3,000

DEC
Compaq
Hewlett Packard
Zeos

High-end workstation:

486DX, 66 MHz	EISA/PCI bus
16 MB RAM (expandable)	Intel Chip
500+ MB hard drive*	UPS
5-1/4" and 3-1/2" high density floppies	DOS 6.xx
17" SVGA monitor	On-site service (2 yrs)
Local bus video	Tape backup
Cache	
16 bit network card	
CD ROM	

* Add a 1 GB hard drive for e-mail repository.

Vendors considered: Price Range: $4,200 to $5,500

DEC
Compaq (Machine to serve as e-mail repository
Hewlett Packard and shared file space is approximately $8,000)

Networked Printers:
HP Laser Jet 4 Plus $1,657 each (recommend purchase of two)

Plain Paper Fax Machine:
950 Inkjet $950 (one)

Configuration Note: Recommend using one HP Laser Jet 4 Plus as the main networked printer for the SERDP staff. Additional HP Laser Jet 4 Plus printer(s) could be networked for additional network print capability or connected to the administrative assistant's workstation as a backup printer in case of network failure. **While it is important to share print resources, it is imperative to maintain backup capability.**

2. SOFTWARE

Listed below are the recommended software packages for the SERDP Office. These software packages or equivalent are needed to meet the SERDP automation requirements. Estimated costs for the recommended software solutions for 7 workstations is approximately $12K to $15K.

Product	Initial License	Cost Per Add'l License
WordPerfect 6.0 for Windows	$299	$265
Windows for Workgroups	$133	$123
Microsoft Office Professional	$543	$483
Microsoft Project	$436	$373
Super TCP/NFS 4.0	$339	$339
Word for Word	$112	N/A

Software prices are from GTSI.[1] A description of each software package follows:

WordPerfect 6.0 for Windows. This is the standard word processing software for SERDP. It provides a GUI interface and includes Grammatik 5, Adobe Type Manager, QuickFinding (indexing and text retrieval program), mail enabling and zoom edit.

[1]Prices are based on current vendor quotes and are subject to change.

Windows for Workgroups: Provides peer-to-peer networking capability which allows disk and printer sharing in the local environment.

Microsoft Office Professional. This is an integrated suite of software that contains:

PowerPoint for Windows. This package allows the user to prepare presentation graphics in a few easy steps using a template.

Excel for Windows. This is a spreadsheet application designed with deep feature set and intuitive user assistance.

Word for Windows. Although WordPerfect will be the standard word processing software for SERDP, this suite of software includes MS Word which is an industry alternative standard. There may be those that prefer to work with this software and save it in WordPerfect format for compatibility.

Microsoft Access. This is a database management program that allows seamless sharing between applications, documents, and data.

Microsoft Project 4.0 for Windows. This package assists the user in planning, managing, and communicating any kind of project. Gant charts show schedules, PERT charts show activity relationships, resource calendars model availability, resource histograms view workloads, resource leveling balances workloads, filtering selectively views project data, sorts, analyzes, reports, and provides plotter support.

Super TCP/NFS 4.0: This is networked software that provides a Windows graphical interface to TCP/IP services. This tool provides SMTP e-mail capability.

Word for Word: This package converts approximately 102 different file formats to other file formats, i.e., converts a MS Word document into WordPerfect 5.1 format.

3. COMMUNICATIONS REQUIREMENTS

The SERDP office will incur costs renovating the new office space. These costs include renovation construction, electrical wiring, telephone communications and data communications. Since construction, electrical wiring and telephone communications fall outside the scope of this plan, only data communciations will be addressed.

Within the capital region, Defense Telecommunications Services (DTS) handles all communications wiring for government-leased buildings. DTS is a DOD entity but is attached to the Administrative Assistant to the Secretary of the Army. Since the DTS staff is small, data communications planning and implementation have been subcontracted to Bell Atlantic. DTS recommends that new tenants jointly survey the target office space with them to lay out equipment locations. In the past, DTS required Bell Atlantic install all data

communications. This includes all wiring taps, hubs, gateways, and routers to provide the requested connectivity. There are some indications that this requirement has recently been relaxed.

The final cost to the tenant will be determined on the basis of how much rewiring is necessary, if the appropriate physical communication infrastructure is already in place on the given floor of the building, if all offices used by the tenant are on the same floor, and if ethernet or token ring connectivity is already provided on the given floor. Some of the necessary costs include expenses for a network hub, connectivity adapters, cabling, connectors, jacks, jumpers, and remote-management software, and labor. Total costs including labor are estimated at $25 K.

4 OTHER CONSIDERATIONS

Services. Government Technology Services, Inc. (GTSI) is a vendor that offers "one-stop shopping." If their services were used, all software and hardware could be purchased from them. In addition, they will preload all purchased software, install/network the equipment, and offer limited orientation in the use of the equipment as well as the software. Their software prices are very competitive and the hardware manufacturer has a known reputation for dependability and reliability. Since their office is located in the greater D.C. area, this option is logistically appealing. GTSI's initial charge for preloading purchased software, installation/networking equipment, and providing equipment and software training is $1,734. Another option would be to contract out similar services. It is estimated that this would take about one man week at $100/hr for a total cost of $4,000.

Optional Printing Requirements. If heavy use of presentation and/or graphics is anticipated, consideration should be given to purchasing a color printer for $1,000 to $2,000 depending on requirements. A duplexing option can be added to the recommended networked printer if desired. The duplexing option is expected to be available for around $2,000 in early fall.

Desktop IV Contract for Workstations: Instead of going open market, purchase the workstations from the Desktop IV Contract. Advantages: (1) readily available (can literally pull from shelf at WES); (2) competitively priced. Disadvantages: (1) Workstations currently available at WES have 14" monitors. Monitor size is a factor when working in an Windows environment. (2) One-stop shopping option would be eliminated.
NOTE: A recent contract modification added 17" monitors to the contract. However, a new order would have to be placed and current Air Force orders would take priority over it.

5. RECOMMENDATIONS

A. Recommend purchasing high-end workstation equipment listed in paragraph 1 of this appendix. This will provide more flexibility and expandability for future growth.

B. Recommend purchasing printers listed in paragraph 1 of this appendix so the SERDP Office will have networked and standalone printing capability. A color printer and the duplexing option for the networked printer can be purchased later as needs dictate.

C. Recommend purchasing a plain paper fax machine listed in paragraph 1 of this appendix so the SERDP office will have faxing capability.

D. Recommend purchasing software listed in paragraph 2 of this appendix so the SERDP Office will have access to word processing, database, spreadsheet, graphics, presentation, project, e-mail, and word-processing format conversion software.

E. Recommend purchasing "one-stop shopping" service as discussed in paragraph 4 (services) of this appendix.

Appendix B. Information Analysis Acquisition Plan

1. HARDWARE

A Unix file server is the recommended platform to host the SERDP Information Analysis Center. Unix is well suited for Internet communications and use as a Web Server. Sun and HP workstations were investigated as file servers. Sun is the recommended server because its operating system is more compatible with a wider range of software and because of Sun's reputation for better support. The prices on the servers researched ranged from $9K to $17K[1] with an expected delivery of 30 days after order.

Low End Server: This configuration will handle up to 2000 Mosaic accesses a day, but is not recommended for running a DBMS or other resource intensive software.

SUN Sparcstation 5	70 MHz
	17" color monitor
	16 MB RAM
	535 MB Internal Hard Disk
	Solaris OS
	.25 inch 150 MB Tape
AddOn	1.05 GB Hard Disk
	4 mm 5 GB Tape Backup
	CD ROM
	Floppy
	AUI adapter cable

High End Server: This configuration will handle the SERDP information needs and provides flexibility and room for future expansion.

SUN Sparcstation 20	50 MHz
	17" color monitor
	64 MB RAM
	1 GB Internal Hard Disk
	Solaris OS
	.25 inch 150 MB Tape
AddOn	4.2 GB Hard Disk
	4 mm 5 GB Tape Backup
	CD ROM
	Floppy
	AUI adapter cable

Purchasing Access: Buying access time on a suitable Unix host is a potential solution that should be considered. A variety of sites provide pay for access services with system

[1] Prices are based on current vendor quotes and are subject to change.

administration and backup services provided. CEAP provides access to Unix hosts at established fees. Oracle DBMS is provided as part of the CEAP contract. Access is available to a CDC 4680, machine costs are:

$ .44/1000 pages of IO (disk or printer)
$ .88/connect minute
$ .04/cpu second

Free Access: There is a Sun 690 that is part of the DOD High Performance Center and available free as a DOD resource. It serves as the WES Mosaic server which is currently being developed. This machine is available now to begin development and test deployment of the SERDP Mosaic server. This machine can serve as an interim platform, however, it is likely that the SERDP functions will need to be transitioned to a permanent host in the future.

2. SOFTWARE

Database Management (DBMS): DBMS software was considered for the IA needs. Several DBMS software packages will more than adequately meet SERDP data requirements. Oracle, Informix and Sybase are well established. The prices range from $8K to $18K depending on the product suite selected. In addition to the initial purchase price, a database administrator is required to maintain the database application. If a centralized database is required to meet SERDP information needs, Oracle is recommended.

Electronic Database Management Systems (EDMS): EDMS software ranges from $10K annually to $75K. WAISgate ($15K) and PLServer ($10K annually) are two packages that are specifically designed for Mosaic applications. ISYS will run on a Unix machine that has a DOS emulation package like PCNFS running, but will not work with Mosaic.

For Mosaic access, Unix system utilities and other free software (e.g. free WAIS), provides good text search capability.

3. RECOMMENDATIONS

A. Development of the Mosaic user interface is considered a primary goal. Begin development on the DOD HPC platform while other important aspects of the SERDP Information Analysis (IA) Center are being researched, developed and implemented. If the SERDP executive staff decides that it is imperative that the IA machine be located on-site, then the hardware acquisition process should commence in parallel with initial development.

B. Acquisition for DBMS and/or EDMS software is not recommended until data modelling and its resulting conclusions are complete.

Appendix C. World-Wide Web Summary

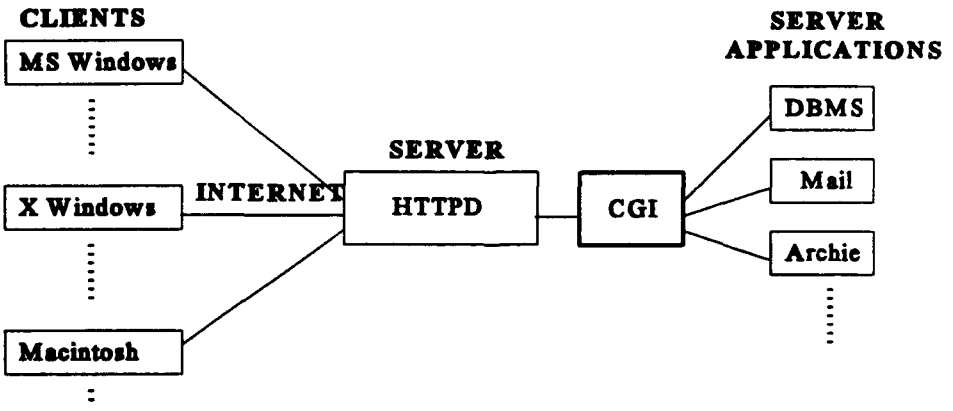
Overview

This document attempts to familiarize the reader with Mosaic, one of the most common vehicles for navigating the World-Wide Web (W^3). It does not go into detail on any particular area of the Web or Mosaic, but it does provide references to Web sites for more information. First the W^3's architecture is provided with a brief summary. Then the different components of the architecture are described separately with online references known as uniform resource locators (URLs). The URLs provide the user means to locate more information on the W^3. Finally, a list of popular W^3 starting points are given. Because of the ever-changing nature of the World-Wide Web and the huge amount of traffic on Internet, the sites mentioned in this document may be unavailable.

Architecture Summary

What is the World-Wide Web? The Web is a large body of knowledge that exists on the Internet. It consists of software (clients and servers), protocols (ftp, gopher, http, etc.) and conventions (HTML, CGI, etc.) that are accessed through a hypermedia interface. The W^3 was first started by the European Laboratory for Particle Physics (CERN - from the earlier French title: "Conseil Europeen pour la Recherche Nucleaire") and has since blossomed into a global effort.

Figure 1. Client/Server Architecture Using Mosaic



A typical session starts by a user opening a URL on a client viewer. This prompts the server into responding, usually by downloading a hypertext markup language (HTML) document. The viewer will format and display this document. The document may ask for input via a fill-out form or image map. After the user responds and the information is transferred back to the server, the server will initiate the common gateway interface (CGI) executable specified in the HTML document. This executable will respond to the user's input in some way (eg. query a database, perform an archie search, send e-mail to another user, etc.).

Components

HTML Documents: A hypertext markup language document provides the text for the client viewer to display. The HTML also provides formatting codes to control the display of the text, embed images and sound, or provide links to other HTML documents. The document resides on the server until a request is made by a client (using a URL). The server then sends the document to the client where it is displayed (can also be saved to disk, depending on the client software).

There are several W³ pages that explain how to create your own HTML documents.

http://info.cern.ch/hypertext/WWW/MarkUp/MarkUp.html
http://www.ncsa.uiuc.edu/General/Internet/WWW/HTMLPrimer.html

URL: A uniform resource locator is analogous to a postal address. It provides the client with a means of locating the server and the document on the server to view. URLs are used to initiate a W³ session and are embedded in HTML documents as links to other pages. The typical form of a URL is <scheme>://<address>/<path (if any)>/<document> where:

<scheme>	tells the client viewer what type of connection is being made. Usually this is http, gopher, or file
<address>	is the logical name (e.g. icchip.wes.army.mil) or the actual address
<path>	is the path of the document you are trying to load
<document>	is the name of the document to load. Usually this file has an extension of .html or .htm

There is a more thorough description of URLs on the following W³ pages:

http://www.ncsa.uiuc.edu/demoweb/url-primer.html
http://info.cern.ch/hypertext/WWW/Addressing/Addressing.html

Clients: The client software for the Web can be anything that communicates using the hypertext transfer protocol (HTTP). There are several viewers available that do this: Mosaic, Cello, Samba, Chimera, etc. For more information about different viewers and how to obtain them, see:

http://info.cern.ch/hypertext/WWW/Clients.

Currently, the National Center for Supercomputing Applications (NCSA) supports the Mosaic HTML viewer on three platforms: Microsoft Windows, X Windows, and Apple Macintosh. The HTML viewer on the client system handles the displaying of text (or hypertext), rendering of images, playing of sound clips, and transferring files. For displaying images or playing sound clips, Mosaic must access another application (eg. LView, MPlayer, GhostView, etc.). Mosaic can be obtained from NCSA free of charge via anonymous FTP to:

ftp.ncsa.uiuc.edu.

Server: The server handles requests from the client software. Typically, the server software runs as a background process (eg. daemon) on a workstation and listens on port 80 for requests. However, NCSA is currently in the beta release of server software for Microsoft Windows. In the architectural diagram (Figure 1) the server has a link to the CGI. This link is what gives the W³ its flexibility.

There are a handful of servers available free of charge on the InterNet. The inventor of the World-Wide Web, CERN, provides a version for Unix and VMS called hypertext transfer protocol daemon (HTTPD). For more information, see:

http://info.cern.ch/hypertext/WWW/Daemon/User/Guide.html.

NCSA also provides a version of httpd for Unix. For more information, see:

http://hoohoo.ncsa.uiuc.edu/docs/Overview.html

Or, for obtaining the server software, it is available through anonymous FTP to:

ftp.ncsa.uiuc.edu.

CGI: The common gateway interface is the mechanism the W³ server uses to communicate with other applications. A CGI program is an executable that communicates with the server to get the user's input. Then the CGI processes that input internally or passes it to another application. The resulting output is returned to the server in the form of a new HTML document.

Many CGI scripts and programs have already been written to accomplish tasks such as: interfacing with finger, interfacing with e-mail, querying a DBMS, converting the system's manual pages to HTML, interfacing with Wide Area Information System (WAIS), etc. Any language can be used to write CGI programs as long as it produces an executable that can receive information from standard input and send data to standard output.

For more information, see the following HTML documents:

http://info.cern.ch/httpd_3.0/CGI/Overview.html
http://hoohoo.ncsa.uiuc.edu/cgi/overview.html

Popular W³ Starting Points

The following URLs point at some popular pages available on the Web:

http://www.ncsa.uiuc.edu/
http://info.cern.ch/
http://hoohoo.ncsa.uiuc.edu/
http://sunsite.unc.edu/
http://www.msstate.edu/
http://athena.wes.army.mil/
http://mr2.wes.army.mil/
http://apollo.wes.army.mil/

Disclaimer

Because of the ever-changing nature of the World-Wide Web and the huge amount of traffic on Internet, the sites mentioned in this document may be unavailable. All references for this document are cited in place using URLs.

Appendix D. References

Aberdeen Group. 1993 (AUG). "Commercial Benchmarks 1993: As Easy As TPC-A, -B, -C," Aberdeen Group, Boston, MA.

Adhikari, Richard. 1994 (JUN). "It Takes More Than MIPS or MHz to Sell Today's Servers," Client/Server Computing, Sentry Publishing, Westborough, MA.

Computer Select. 1994 (MAY). Software and Hardware Product Specification, Ziff Communications Company, NY.

Duke, Alice. 1988 (MAY). "WES Automation Plan," USAE Waterways Experiment Station, Information Technology Lab, Vicksburg, MS.

Frontier Technologies. 1993 (FEB). "Super-TCP/NFS for Windows," Frontier Technologies, Mequon, WE.

Hughes, Kevin. 1994 (JUN). "Everything You Need to Know to Build Your Own WEB Server," OpenSystems Today, CMP Publications, Manhasset, NY.

Labat-Anderson. 1994 (MAY). "Proposal on SERDP Use of Internet," Arlington, VA.

Levie, Ted. 1994 (JUN). "Riding the Internet Wave," Open Computing, McGraw Hill, Inc., Hightwtown, NJ.

Malone, Michael. 1994 (JUN). "It's About Trust, ORACLE," Open Computing, McGraw Hill, Inc., Hightwtown, NJ.

Microsoft. 1994. Mail User's Guide, Windows for Workgroups, Microsoft Corporation.

_____. 1993 (APR). "Microsoft Ships Microsoft Mail 3.2 for PC Networks," Redmond, WA.

Nash, Kim. 1994 (MAR). "Informix Surges Ahead with Online 7.0," Computerworld, Vol. 28, No. 13, CW Communications, Inc., Framingham, MA.

Rooney, Paula. 1994 (JAN). "MS Mail Getting 'Smarter'," PCWeek, Ziff-Davis Publishing Company, New York, NY.

Thornton, Shannon. 1994 (JUN). "World-Wide Web Summary," USAE Waterways Experiment Station, Information Technology Lab, Vicksburg, MS.

USACERL. 1994. "The Defense Environmental Network & Information eXchange Fact Sheet," Champaign, IL.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	September 1994	

4. TITLE AND SUBTITLE
Strategic Environmental Research and Development Program (SERDP) Information Analysis Center Implementation Plan

5. FUNDING NUMBERS

6. AUTHOR(S)
Peggy Wright, David Stinson, Shannon Thorton, Jo Ann Welch

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army Engineer Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

8. PERFORMING ORGANIZATION REPORT NUMBER
Miscellaneous Paper
ITL-94-1

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Strategic Environmental Research and Development Program
U.S. Army Corps of Engineers, Directorate, Research & Development
20 Massachusetts Avenue, NW
Washington, DC 20314-1000

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES
Available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

The Strategic Environmental Research and Development Program (SERDP) is a multi-agency program appropriated by Congress to meet environmental obligations and concerns. A major purpose of the program is to support significant environmental research and share the findings with governmental and private organizations. A comprehensive information implementation management plan is required to determine the methodologies needed to meet the SERDP information requirements.

This paper discusses those needs and proposes modern solutions for the timely collection and dissemination of SERDP information. It also addresses the potential of meeting most of the SERDP information requirements through the use of an Internet-accessible, Mosaic-based interface.

14. SUBJECT TERMS	15. NUMBER OF PAGES
See reverse.	39
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED		

14. (Concluded).

Bulletin board system	Internet
Database management system	Mosaic
Electronic document management system	Office automation
Information analysis	World-wide web