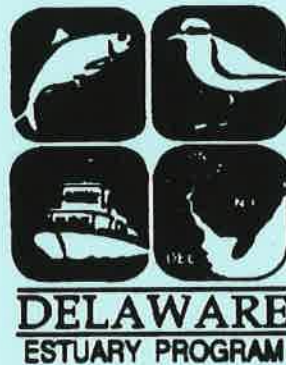


R I M S

Regional Information Management Service

Final Report



**DELEP Report #94-02
Data Management Plan
May 1994**

**Prepared by
American Management Systems, Inc.**

RIMS

Regional Information Management Service



DELAWARE

ESTUARY PROGRAM

Data Management Plan
May 1994

Prepared by
AMS American Management Systems, Inc.

Executive Summary

The Delaware Estuary Program (DELEP) plans to implement a Regional Information Management Service (RIMS) to provide the community with a valuable tool for data management and regional communication. One of the major data problems within any estuary program is identifying available data. This service will solve that problem by allowing users to easily identify regional data sources. Moreover, RIMS will support a platform for community-wide dialogue via a bulletin board system.

The proposed design for this service includes a data manager, hardware, and customized software. The data manager will supplement the system components by coordinating data providers and users and addressing questions and concerns that cannot be resolved electronically. The recommended hardware includes a UNIX server, printer, modems, and back-up tape drive. A system administrator will support the data manager by maintaining the hardware and software.

A critical factor to long-term RIMS success is the customized software. The main features include a bulletin board system (BBS), data source index (DSI), and data depot (DD). Implementing the BBS involves customizing commercial software to establish mailing lists and monitor system usage. The DSI includes a user-friendly interface to accommodate both experienced and novice users, a robust search mechanism that quickly locates available data sources, and utilities to update and maintain data stored in the index. The DD allows users to retrieve selected data sources from remote locations. This feature requires a set of utilities that can dial into other systems, temporarily import data into the depot, and download it to the user's machine. In addition, these software features must be integrated into a system that appears seamless to the user. RIMS should also include security features to restrict access to information that is stored on RIMS and other systems that RIMS is accessing. Finally, RIMS should include utilities that perform periodic back-ups to protect data and maintain system integrity. Chapter 5 provides a strategy and cost estimates for developing and installing this software.

DELEP has three options for RIMS development and maintenance: 1) select an existing organization that can provide the recommended components; 2) purchase the necessary hardware, fund system development, and hire a data manager; or 3) combine options #1 and #2. Existing organizations were asked if they could provide any of the recommended components. Based on responses, option #1 is not feasible. However, both the Philadelphia Maritime Exchange and EPA Region II could provide part of the necessary hardware. Alternatively, Delaware River Basin Commission offered assistance with hardware and personnel. Even though the state of New Jersey has compatible hardware, they "...think it would be inappropriate for a state organization to be a site for RIMS." Therefore, DELEP should either completely fund the project or combine resources with one of these organizations. Additional information about existing organizations is provided in Appendix C.

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I. Introduction

The Delaware Estuary Program (DELEP) is committed to increasing access to existing data, implementing minimal data management procedures, and providing a catalogue of estuarine data sources. As the estuary's data steward, DELEP will maximize the return from data collection investments by developing and maintaining a Regional Information Management Service (RIMS). RIMS will also try to facilitate coordination and, hence, planning among data providers who use Delaware estuary data themselves. RIMS can also limit the number of redundant data collection exercises by making the community more aware of available data sources and on-going studies.

The proposed RIMS design can provide the community with a valuable tool for data management and regional communication. The primary function of the service is to increase access to data sources within the region. In addition, RIMS will support a feature that will allow the entire community to conduct a dialogue about the estuary program. Although the service's effectiveness is proportional to its overall level of use, RIMS should help the Delaware estuary community as a whole acquire and analyze more data at some cost savings. In addition, a data manager will be available to assist providers with distributing data that limits the number of direct requests that providers will receive. This individual will also supplement the system by addressing questions and concerns that cannot be resolved electronically.

RIMS will facilitate and promote data sharing by addressing the following minimum criteria --

- ☐ Public visibility
- ☐ Technical architecture should include special software
- ☐ Functional design should include guide to very easy access
- ☐ A data manager who is knowledgeable about regional data sources and experienced in data exchange and interpretation

In order to maximize the system's effectiveness, RIMS must simultaneously satisfy the above criteria and

- ☐ Provide information and assistance to users in a cost-effective manner
- ☐ Ensure consistency with DELEP's Comprehensive Conservation and Management Plan (CCMP)

In addition to the above objectives, RIMS must be capable of evolving to meet the Delaware estuary's changing needs. Although the service will always provide "human" and "electronic" assistance to current and would-be users of estuary data, this basic mission may expand. For example, RIMS should be capable of supporting communications among DELEP committee members, peer organizations, and other interested parties.

American Management Systems, Inc. (AMS) used these objectives in the preparation of this data management plan which includes the following sections.

- ❑ The **Requirements Analysis** identifies critical success factors, extracts information from other NEPs, and outlines data access problems and proposed solutions.
- ❑ Based on the requirements analysis and input from members of the DELEP community, AMS presents the proposed **Conceptual Model**.
- ❑ AMS then presents the **Design Implications** associated with this model based on the results of our project work. This section provides valuable insights into how DELEP should implement and maintain RIMS.
- ❑ Based on the assumptions in the above sections, AMS recommends an **Implementation Strategy** that DELEP should use to implement the conceptual model. This strategy includes software and hardware requirements, system development tasks, and associated cost estimates.

These sections summarize the results of a nine month study and propose a data management strategy. Additional details about how this information was obtained and how particular monetary figures were derived are provided in the Appendices.

II. RIMS Requirements Analysis

AMS prepared a high-level requirements analysis for RIMS. The analysis summarizes the service's critical success factors (*i.e.*, key information needs, pivotal decision points, and defining assumptions), describes how other NEPs manage data, and outlines several solutions to current and potential data access problems. Additional details about this analysis are provided in the Feasibility Report (Appendix B).

The service's critical success factors

Participants at the first RIMS Joint Application Design (JAD) session identified several objectives which will be critical to the success of RIMS. Defining critical success factors helps to concentrate resources on the most important project areas by highlighting key information needs, determining pivotal decision points for the project, and defining assumptions that need review. The critical success factors for RIMS are outlined below.

- ☐ RIMS should facilitate and promote data access and exchange.
- ☐ RIMS should provide information and assistance to users in a cost-effective manner.
- ☐ RIMS should include information about data in both electronic and hardcopy formats (*e.g.*, gray literature, reports).
- ☐ RIMS should be easily accessible to all potential users on any platform.
- ☐ RIMS should include a data manager with knowledge about regional data sources and experience in facilitating data exchange.
- ☐ RIMS should be visible and easily accessible to the public (*e.g.*, available at public libraries, listed in the blue pages).
- ☐ RIMS should act as a self-guided on-line access to selected data sets.
- ☐ RIMS should be able to monitor progress, success, and failure and evolve accordingly.
- ☐ RIMS goals and implementation should become part of the CCMP.

AMS incorporated these factors into the conceptual model and recommended an implementation strategy. In addition, DELEP should continue to use these critical success factors to guide RIMS design and development efforts and ensure that the service accomplishes its overall goals.

NEP Data Management Strategies

Estuary programs employ a variety of data management strategies based on either distributed data storage or centralized data management systems. The most expensive and comprehensive systems involve central, standardized storage of all estuary data. Usually, the decision regarding the type of strategy to select is driven by the amount of resources the program can dedicate to data management. Regardless, the average Tier I National Estuary Program spends 10 to 20 percent of its annual budget on data management.

As the RIMS Feasibility Report explains, several programs have developed data source indexes to facilitate distributed data storage. This alternative is a relatively low-cost solution to data management. Given the popularity of the data index, AMS believes this approach also provides DELEP an effective method for data access and exchange.

Data access problems and recommended solutions

AMS's research, analysis, and discussions with other NEPs indicate that estuary programs experience several common data access problems. As NEPs have limited resources and authority, they cannot overcome every obstacle. However, several NEPs have successfully implemented data management strategies that address at least some of these problems. The following table indicates the primary data access problems facing NEPs and how RIMS can provide a solution for DELEP.

Table 1: Data Access Problems and Proposed RIMS Solution

Data Access Problem	Proposed RIMS Solution
Many institutions and investigators collect and maintain data.	RIMS should provide a single, publicly accessible source for identifying those organizations. RIMS could also provide software for accessing data at remote locations.
Data are stored across numerous operating systems, software packages, and paper or computer files.	RIMS should describe how data are stored, even though users would be responsible for data translations. If funds are available, RIMS should consider providing some basic translations.
Documentation and quality control for the data files are fragmentary and inconsistent.	RIMS should support an electronic index for locating this information. While documenting historical data is difficult if not impossible, DELEP might also consider developing minimal documentation standards for current and future studies.
There is no central record of what data were collected nor a directory of contacts to obtain this data for secondary or tertiary analysis.	A major function (e.g., data source index) of RIMS should provide that directory of contacts.
Researchers are unaware of similar ongoing efforts. As a result, there is a substantial duplication of effort and scientific studies fail to reflect the total amount of collected data.	RIMS should provide a mechanism (e.g., bulletin board system) to display notices about upcoming and ongoing studies. This feature should also serve as a platform for general estuary use and a follow-up to DELEP.

III. Conceptual Model

AMS employed an iterative process in the development of the conceptual model. Based on DELEP's initial concept, AMS designed a preliminary model which was evaluated by members of DELEP. AMS modified the model based on two JAD sessions with the DELEP community. This section outlines the proposed conceptual model. Additional details about the design process are provided in Appendix B: Feasibility Report.

Components of RIMS

AMS developed a conceptual model for RIMS that includes three main components: (1) data manager; (2) centralized electronic system; and (3) data depot. Moreover, the centralized electronic system contains two distinct features: a bulletin board and data source index. The system, which is accessible via modem from remote locations, allows users to locate information about available data sources and communicate with other members of the DELEP community. The data depot provides a warehouse of frequently requested data sources. This depot could also include software that allows direct access to the data. The data manager helps users locate and obtain data sources as well as maintains the data source index, the bulletin board system, and the data depot. Each of these components are described below.

Bulletin Board System

The RIMS bulletin board will provide a platform for communication among users, data providers, and the data manager. In many instances, the bulletin board will serve as a channel for requesting data sources. For example, data providers who wish to limit phone calls from users may require that all requests for data be made through the RIMS bulletin board. The bulletin board will also provide a platform for the discussion of data sources, methodologies, study results, and upcoming activities in the Delaware Estuary. Users will be encouraged to use the bulletin board to post analysis of RIMS data sources as well as techniques or tools used for data translation and integration. In addition, the bulletin board can serve as a platform for general DELEP communication including providing notices about upcoming meetings and discussing various regional issues.

Data Source Index

The RIMS data source index will provide a consolidated register of data sources for the region. The index will contain entries for automated database files as well as for hardcopy data sources such as reports and maps. In addition to some basic information such as what type of data was sampled, when and where it was collected, and how to obtain copies of the data source, the data provider will also supply a textual abstract with more detailed information about the source.

Data Depot

The RIMS data depot will consist of a library of data sources stored by the data manager for distribution to others. Data sources may be included in the depot either at the data provider's request (*e.g.*, to limit requests from individual users) or at the data manager's suggestion (*e.g.*, because the data source is frequently accessed). The data source index entries for all sources in the depot will indicate that they may be obtained directly from the data manager. Eventually, data from the depot could be distributed electronically through a user-friendly interface. (When distributing data sources from the depot, the data manager will comply with all access restrictions specified by the data provider.)

Data Manager

The data manager will be responsible for the overall operation and maintenance of RIMS. The data manager will provide "real-time" supplements to the information provided through the data source index and bulletin board. In addition, the data manager will help users locate and obtain data sources and maintaining the data source index, bulletin board, and data depot. The data manager will also be expected to conduct outreach activities to increase awareness of RIMS across the DELEP community.

Interactions among RIMS Components

Figure 1 shows the interactions among the components of RIMS. You should note that the bulletin board system and data source index are shown separately because of functionality. Technically, these two components comprise a single centralized electronic system. In addition to the basic RIMS components, this diagram shows the DELEP community: data providers and data users.

The following example describes the interactions among the components shown in Figure 1.

- ☐ Searching for public health data, a *Data User* would use the *Data Source Index*.
- ☐ Unfamiliar with the *Data Source Index*, a *Data User* would decide to conduct a structured search.
- ☐ Given an interest in a particular type of data, the user selects data type from the list of searchable data fields (e.g., data type, provider's organization, time period, key words).
- ☐ Using the data type menu, the *Data User* selects public health data.
- ☐ Wanting to limit the search, the user enters 1991 to 1993 in the searchable data field known as time period.
- ☐ After searching the *Data Source Index*, the *Data User* is notified that there are five selections that meet the search criteria and displays titles for those data sources.
- ☐ Since the *Data User* is interested in the second and fourth data sources, the *Data User* selects those abstracts.
- ☐ After reading the abstracts, the user learns the second selection is available on disk from the *Data Depot* and the fourth is available in hardcopy from the U.S. Fish and Wildlife Service (USFWS).
- ☐ Using the *Bulletin Board System*, the user requests copies of these data sources from the *Data Manager* (data source 2) and the *Data Provider*, USFWS (data source 4).
- ☐ The next time USFWS checks the *Bulletin Board System*, he will respond to the request by mailing the *Data User* the fourth data source.
- ☐ Similarly, the *Data Manager* will provide the *Data User* with the second data source.

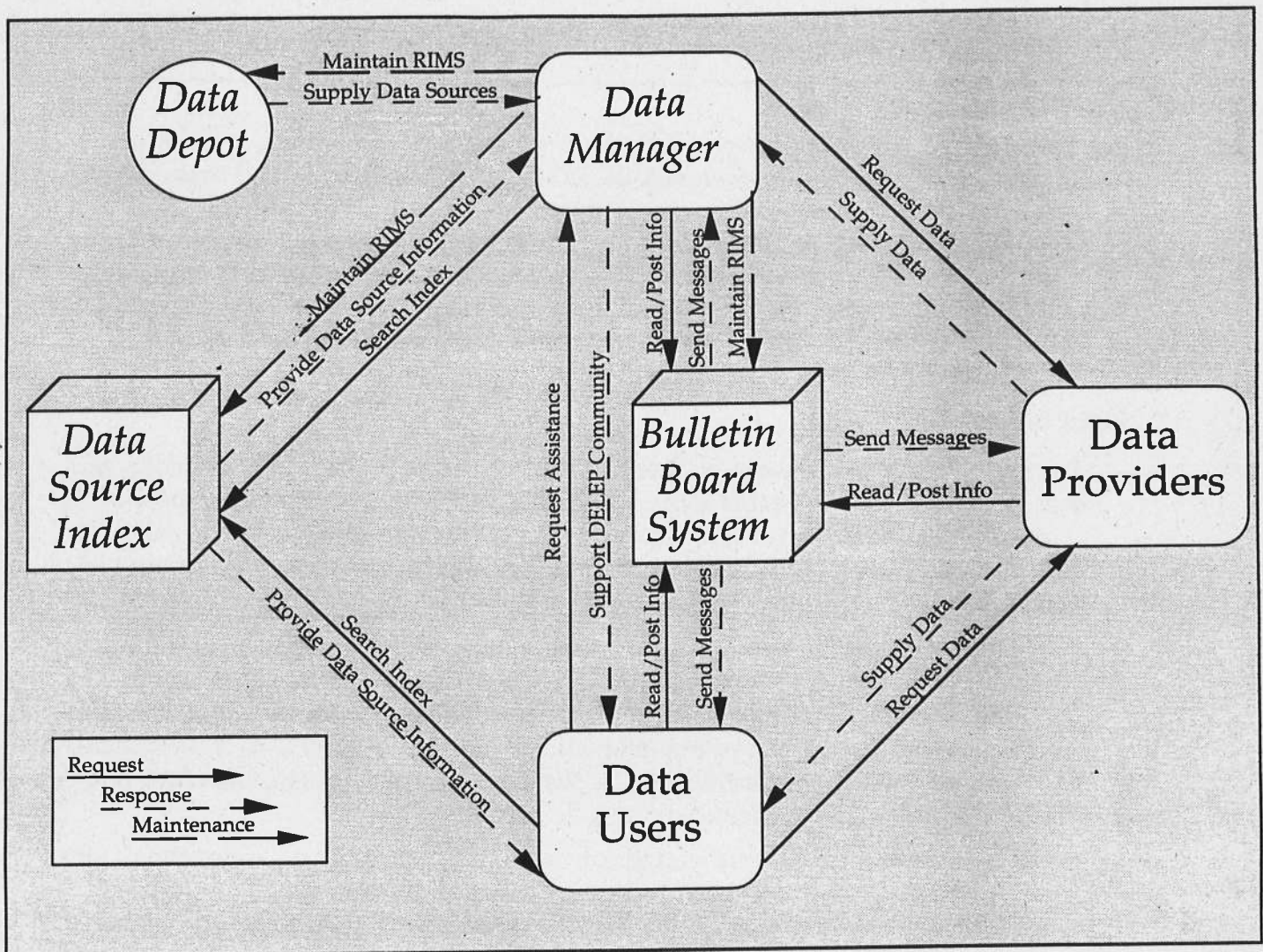


Figure 1: RIMS Conceptual Model

IV. Design Implications

To design and validate the conceptual model, AMS conducted a user needs analysis and functional assessment of RIMS. The results of the user needs analysis provided information about system use, data availability, and the community's interest in RIMS. The functional assessment evaluated the feasibility of the conceptual model. This section outlines the results from these tasks along with possible implications that could effect the implementation strategy. For details about how these tasks were performed, see Appendix A.

User Needs Analysis

To ensure user needs were addressed, AMS conducted two JAD sessions and one data management workshop. In addition, AMS received 76 responses to a data user survey which represented a broad spectrum of the user community.¹ Results of these tasks suggest several strategic implications for designing, implementing, and maintaining RIMS.

- ❑ The service's potential users represent a broad spectrum of scientific and technological sophistication. This suggests that RIMS should be user-friendly (*e.g.*, provide an interface that walks the inexperienced user through the system and allows the experienced user to quickly access specific information). A simulated graphical user interface (GUI) may reconcile these competing demands.
- ❑ The service's broad range of potential users (*e.g.*, scientists, city planners, public citizens) require numerous data types to perform a variety of functions. To develop a service that is sufficiently intuitive, the system developers must be familiar with a range of data management issues for scientific, public health, environmental and estuarine programs.
- ❑ The service should require that data providers submit reference information about data sources in electronic format. Therefore, the system should provide abstract and metadata templates that providers can easily complete or update. At a minimum, the templates should include fields for the provider's address, name, phone number, access restrictions, and search terms (*i.e.*, key words).
- ❑ The service should reduce the response time to requests for data. To minimize response time, the system should include a function that (1) monitors how quickly data providers respond to requests and (2) produces reports that measure continuous improvement. This

¹ The low response rate can be contributed to the fact that the survey was distributed to a wide spectrum of organizations. Based on later discussions, using the response rate as a measure of community interest would underestimate the true need for RIMS.

function would be in addition to features that monitor among other things who is using the service, when they use it, and how often.

- ☐ The service should support a public outreach function that increases the general knowledge about the availability of Delaware estuary data. The system should support this function by monitoring RIMS use and producing reports that support "marketing" the service. DELEP should begin designing the public outreach strategy during the system design phase. The strategy should include training materials, abbreviated user manuals for wide distribution, workshops, promotional and educational videos, and advertising (e.g., public notices).
- ☐ In an ideal system, users want to view and select data based on a geographic display of stations rather than defining searches with words or codes. NOAA's COMPAS is a good example of a system with this type of functionality.
- ☐ Many users also expressed the need for user-friendly access to files stored in national databases (e.g., ODES and STORET). At a minimum, the current ODES/STORET Bridge or RIMS could provide more intuitive, less global dictionaries (i.e., if you select the DELEP monitoring program, the state dictionary should only include Delaware, New Jersey, and Pennsylvania). Ideally, some key files should be available directly through RIMS.
- ☐ RIMS could include abstracts for data in STORET and provide directions for how to obtain those data sets. For example, the abstract should signify a single code for all DRBC data and then subset that data by type of study.
- ☐ For users of the ODES/STORET Bridge, DELEP could be defined as a polygon rather than the traditional rectangular area.
- ☐ RIMS could be available to users not only via modem but also through Internet.
- ☐ RIMS could act as the central data index for the region alerting users and possibly providing a link to other systems such as STORET and ODES.

Functional assessment

Since the success of RIMS also depends largely on the participation of data providers, AMS conducted a two-part functional assessment (i.e., data provider survey and research and data collection project). The data provider survey asked providers how often they currently receive data requests, whether they would use RIMS, and how they would interact with the service. The research and data collection project evaluated the obstacles to obtaining data as a typical RIMS user. During this exercise, AMS noted provider's helpfulness, measured the length of time between requesting and receiving

the data, and evaluated how much effort would be required for the secondary user to format the data for analysis.

The results of this assessment can be broken into three categories: Regional Data Access, RIMS Demand Estimate, and Other Implications. Additional findings and details about how these tasks were performed are available in Appendices A and B.

Regional Data Access

While data providers seemed very willing to assist, AMS noted several points for DELEP's further consideration.

- ❑ Data providers will supply actual data to RIMS users in several formats (e.g., spreadsheets, text files, maps, coverages). If the data manager wants to use the data or assist users with the data, the service should acquire a variety of software applications that will enable the data manager to open and review various data files.
- ❑ Data providers generally require that data requests include particular pieces of information (e.g., geographic coordinates, sample frequency, time frame). To help users make complete data requests, RIMS should provide a template or sample request form. If data providers have established such a template, it should be provided in the data source index or bulletin board system.
- ❑ Data providers often distinguish between the contact from whom a user would obtain the data and from whom a user would ask technical questions. AMS suggests the template that DELEP designs for the data abstracts include spaces for both contacts.
- ❑ Data providers will frequently give users hardcopies of their data for free; however, they often charge for electronic copies. The providers explain that electronic copies require them to extract files from their data management systems for each individual request. The cost to obtain an electronic data file may exceed \$100. RIMS could pass-on, perhaps, substantial savings to the user community by obtaining annual updates to even a portion of the providers' electronic files and making this data readily accessible to users electronically on the data source index.

RIMS Demand Estimate

AMS evaluated the current demand for DELEP data as a baseline for the number of times users would access RIMS to request information. Based on the conceptual model, users will access the service's centralized electronic system (*i.e.*, bulletin board system and data source index) via modem. To gain access, both the user and RIMS need a dedicated modem for each transaction. Therefore, additional users will be unable to access RIMS when every modem connected directly to the server is already in use. For example, a fifth user cannot gain access to RIMS if the service has only four modems.

AMS developed the following demand estimate equation for determining the appropriate number of modems based on the results of the data provider survey. This estimate represents a percentage of the number of requests that data providers currently receive and number of potential users. If additional information becomes available, other values can be substituted into the equation to determine the actual number of modems. The demand estimate equation, however, will still apply.

$$\frac{\text{\# of Users} * \text{User Time}}{\text{Modem Time} * \text{Peak Time Span}} = \text{\# of Modems}$$

☐ **# of Users: 250 people**

DELEP identified 473 potential users (*i.e.*, number of individuals who received the data user survey). Even though only 16% or 76 individuals responded, RIMS should be able to attract additional users once implemented. In addition, DELEP should anticipate that many members of its current committees (*e.g.*, 300 plus STAC members) will use the system for its BBS capabilities. Therefore, AMS assumes that if the system is implemented and well publicized, RIMS would attract at least 250 users.

☐ **User Time: 15 minutes/person**

System access time will be dependent on user interface, user familiarity, and type of request. If the user requests all biological data for the Lower Delaware Bay and identifies 3 data abstracts to scan which are approximately 5 pages each, it may take the user 20 minutes. If the user is just posting a message on the BBS, he may only use RIMS for 5 minutes. AMS assumes that the average user time will be 15 minutes.

- ❑ **Modem Time: 300 minutes/day** (5 hours * 60 minutes/hour)

Many people will access the system when they begin the day (8:30 - 9:30), after lunch (12:30 - 2:00), and before leaving the office (3:30 - 5:00). In other words, DELEP will find demand concentrated during four hours of the business day. In addition to these peak times, other users will probably access the system for an additional hour a day. On an average day, a single modem would be used for 5 hours.

- ❑ **Peak Time Span: 3 days**

This parameter signifies when the system will experience the greatest number of calls. Based on the data provider survey, the majority of data requests come four times a year. AMS assumes that these requests correspond to the monitoring seasons (*i.e.*, users requesting seasonal data). Therefore, RIMS should expect higher demands during certain periods of the year. In addition, AMS assumes most organizations develop reports during the same time periods (*e.g.*, end of fiscal year). Based on AMS's experience with EPA's NCC mainframe, the system receives a lot of calls during the last week of September when people are finalizing reports and papers. Even though the system is used throughout the year, RIMS should be able to accommodate peak periods as well. Therefore, AMS assumes that most RIMS users will make requests over a three day period at those periods of the year when data are in demand.

- ❑ **Computing Number of Modems:** $(250 * 15) / (300 * 3) = 4.17 < 5$

Based on the above assumptions, AMS computed the need for 5 modems. DELEP should also purchase another modem that the data manager can use to access other systems (*i.e.*, using another BBS, accessing data from ODES or STORET).

$$\text{Total Number of Modems} = 5 + 1 = 6$$

Even though RIMS could provide fewer modems by modifying some parameters (*e.g.*, # of users = 100), DELEP should consider the consequences to users. For example if DELEP does not implement sufficient hardware to accommodate peak demands, users will get an unfavorable impression of the service that will negatively influence their decision to use RIMS the next time they need data. If the system is under-utilized because potential users cannot gain access, DELEP will fail to maximize the return on its substantial capital investment for system development. While the cost of an additional modem is not substantial, the loss of a potential user may be significant.²

² DELEP should note that the incremental cost difference between 2 and 8 modems is the cost of a single modem. If DELEP decides to use 9 or more modems, additional hardware will need to be added.

Other Implications

In addition to the demand estimate, the data provider survey suggests several other strategic implications for designing, developing, and implementing RIMS.

- ☐ Several providers will participate in RIMS if it does not require additional level of effort for their organization (*e.g.*, time and money). To encourage these providers to participate, DELEP should develop some materials outlining the benefits RIMS can offer to data providers. This will increase participation among data providers and provide more data for RIMS users.
- ☐ Since many providers expressed interest in using the data depot, RIMS should include some functionality that will reduce the burden of disseminating that material including hardcopy data sources. For example, RIMS might include a data scanner that would enable RIMS to create electronic files from hardcopy reports. Subsequently, RIMS could store and distribute the file electronically.
- ☐ On-line access to some files would substantially shorten the service's average response time. Although participants in the JAD sessions expressed some concern about on-line access to data files because of monetary reasons, AMS suggests that DELEP further consider this issue.
- ☐ A large quantity of the estuary's data is stored in STORET, one of EPA's national water quality databases. While users realize this data is available, few know how to access it. RIMS could provide a mechanism for users to access those data sources through the data depot or data source index. This functionality could provide a valuable tool for the community and potentially reduce the demand on the data manager.

V. RIMS Implementation Strategy

Based on the requirements analysis, conceptual design, and design implications, AMS proposes the following strategy for implementing RIMS. As part of the conceptual model, AMS believes that DELEP should provide electronic access to the data depot. Electronic access to the data depot would reduce the data request response time by providing users with limited access to data. DELEP can provide this capability without standard data formats. For example, RIMS can store an ARC/INFO coverage and ASCII text file in the same manner that you save WordPerfect and LOTUS files on the same diskette. With this functionality, DELEP could also provide access to national databases (*e.g.*, ODES, STORET). These systems store large quantities of data for the estuary region and would add tremendous value to RIMS users who are unfamiliar with those database management systems. In addition to adding value for RIMS users, this alternative reduces the workload of the data manager which will allow him to spend more time working directly with members of the DELEP data community.

The following strategy incorporates this capability. Even if DELEP is not interested in providing this level of functionality, the basic strategy remains the same. The following strategy describes the software and hardware that DELEP would need to acquire and the tasks needed to implement RIMS. A development and maintenance budget are also provided in this chapter. The final section describes the benefits of implementing this alternative and discusses some enhancements that DELEP would be able to incorporate into RIMS initially or at a later date. Appendix C provides a break-down of costs, potential implementation partners, and additional issues that DELEP should consider before implementing RIMS.

Software Architecture

RIMS is designed to facilitate data/information exchange among users. A critical success factor for RIMS is careful development of the core software. AMS recommends that RIMS integrate four components:

- 1) an enhanced version of a commercially available electronic bulletin board system (BBS)
- 2) a custom designed data source index (DSI)
- 3) electronic access to the data depot
- 4) a set of data/system management utilities

Bulletin Board System

Based on AMS's experience with system development projects for the Ohio Environmental Protection Agency and the Minnesota Pollution Control Agency, AMS believes it is more economically feasible to enhance an existing BBS software package than it is to create one. The following bullets outline the functionalities that a commercially available BBS software package should support.

- ☐ User-friendly, menu-driven access to electronic mail functions
- ☐ Menu-driven access to bulletin board files and directories; capability to list, edit, and download any file defined as accessible to the user
- ☐ Menu-driven interface for the data manager to establish file access permission and BBS passwords for every BBS user
- ☐ File editor, with the same features as popular word processing applications (e.g., Microsoft Word, WordPerfect)
- ☐ Ability to run additional applications from within the BBS
- ☐ Comprehensive transaction logging and statistical management system for tracking BBS use and assigning BBS access fees to users

In addition to these functions, AMS recommends enhancing the BBS software's transaction logging function to provide RIMS system maintenance reports. These automatically generated reports will support the data manager's public outreach and continuous improvement efforts. The interface can also be modified to meet specific program needs.

One software package that satisfies these functionalities is Z/Max Exchange BBS software developed by Computer Solutions, Inc.

Data Source Index

The data source index (DSI) is designed to provide RIMS users with a structured search capability of all information stored within RIMS. This application, like the BBS, will provide a user-friendly, menu-driven interface to the information about data sources. The following bullets outline the functionality of this application:

- ☐ A robust search mechanism which provides several search criteria (i.e., location, time period, organization, data type)
- ☐ A user-defined search index, which speeds user queries for frequent users (i.e., ability to search using previous requests)
- ☐ An administrator utility, which loads new or updated information into the index and/or deletes old information from the index

These functionalities can be implemented using standard programming software.

Data Depot

The data depot would store electronic copies of data sources submitted to the data manager that users would be able to access during a RIMS session. In addition, the data depot would include a national database data access (NDDA) utility that provides RIMS users with data extracted from national databases (e.g., BIOS, ODES, STORET). While the NDDA application does not provide RIMS users with on-line access to these databases, it does provide a user friendly, menu driven application which allows RIMS users to request a limited set of data. The NDDA utility would also allow users to request that additional files be added to the data depot. After the user places the request, the NDDA utility would access each database to retrieve the requested data under the data manager's national database account. These data are then downloaded to RIMS and loaded into the data depot.

The NDAA portion of this software has only two fundamental requirements:

- ☐ The data manager must maintain current data access accounts with each national database.
- ☐ The RIMS system architecture must either be connected to Internet via a modem or have direct access to the Environmental Protection Agency's wide area network (WAN).

These functionalities can be implemented using standard programming software.

Data/System Management Utilities

In order for the data manager to provide seamless operation of RIMS, several data and system administrative utilities must be developed to automate the more tedious administrative tasks. These utilities provide file translations, system back-up activities, system maintenance and accounting. These utilities can also be developed using standard programming software.

Hardware Architecture

To adequately support the RIMS concept, AMS recommends a system architecture using an IBM RS6000 UNIX workstation and a separate personal computer for the data manager. The following section outlines the RIMS Hardware Architecture, including the rationale for a UNIX based solution.

UNIX provides RIMS with support for several simultaneous users, which provides the greatest flexibility, in terms of RIMS functionality, to RIMS users. While RIMS is implemented on a UNIX workstation, *RIMS users are not required to use UNIX*. In fact, most RIMS users will never be aware that

RIMS is a UNIX application because RIMS provides the user interface from start to finish.

There are several distinct advantages to implementing RIMS under UNIX, as opposed to another operating system, such as DOS or OS/2. Much of the functionality included within UNIX must be explicitly built or added to a non-UNIX system. This may significantly add to the cost of implementing and generally increases the risk of maintaining these systems. The following bullets outline some inherent capabilities of UNIX:

- ☐ Designed to support several simultaneous users efficiently
- ☐ Provides sophisticated user and data access security
- ☐ Handles large volumes of data easily
- ☐ Provides a very powerful set of commands

UNIX Server

AMS proposes the IBM RS6000 POWERstation 370 as the UNIX server to support RIMS. The IBM RS6000 series is a well established line of UNIX workstations (*e.g.*, work-group servers) that provide excellent price/performance benefits for a relatively low investment risk (*i.e.*, a stable computer platform from a mature vendor). This server provides sufficient power to support the projected RIMS workload, with room for enhancements as the user community's needs grows.

Modems

Users will access RIMS via a telecommunication package and modem from their personal computer. This will connect to a RIMS modem through a standard telephone line. Based on the RIMS Demand Estimate described in Chapter 4, RIMS support six simultaneous users; thus, DELEP needs to purchase six modems and telephone lines. When RIMS is fully utilized by six simultaneous users, additional users attempting to access RIMS will receive a busy signal until one of the six users hangs-up or logs-off RIMS.

Data Devices

Since RIMS is a data management system, RIMS must support access to the most common electronic data exchange media (*i.e.*, 5.25" diskette, 3.5" diskette, 0.25" tape cartridge, 8mm tape cartridge, and CD-ROM). This allows RIMS to accept and provide data in the most accessible form for RIMS users. These devices also provide RIMS with the option of supporting media translations for users who do not have this equipment (*e.g.*, moving data from a CD-ROM to an 8mm tape cartridge or 0.25" tape cartridge to a 5.25" diskette). The RIMS Demand Estimate also suggests a storage capacity of one gigabyte (roughly seven hundred diskettes). The costs of these items are included as part of the hardware in the cost estimate (see Appendix C for details).

Back-up System

Since the data stored within RIMS is critical to DELEP's mission, AMS recommends a tape back-up of the entire RIMS system once-a-week. The 8mm tape cartridge device is ideally suited to this task. Since a system failure may result in the loss of any and all data since the last back-up, this is one of the most critical aspects of RIMS. To prevent system failures from occurring, AMS also suggests that the entire system be protected by an UPS (Uninterrupted Power Supply). This relatively inexpensive piece of equipment protects delicate electronics from power surges and in the event of a power failure, provides enough battery power to log all users out of RIMS and save all data to disk.

Data Manager's System

In addition, the data manager will require a personal computer to run office management applications, to prepare memorandums, public outreach materials, or financial reports (e.g., WordPerfect, Lotus, dBase). While a counter-part for every one of these applications exists for UNIX, these applications are more cost-effective under DOS or Windows. This PC will be directly connected to the UNIX workstation; thus, the data manager will have the same access to RIMS as RIMS users.

Printer

A laser printer is included in the system to provide hard copies of the data source index, public outreach materials, memorandum, and financial reports. While the printer will primarily be used by the data manager, DELEP may decide to support limited user printing from RIMS. Thus, AMS has included a mid-range Postscript printer as part of the Hardware Architecture.

A cost breakdown of the hardware is provided in Appendix C.

RIMS Development Tasks

AMS believes that RIMS could be implemented in six months. The following six tasks outline all of functional aspects necessary to implement RIMS.

Task 1. Hardware/Software Procurement

The first task initiates the procurement for all of the hardware and software necessary to implement RIMS. This task includes contacting vendors and ordering the appropriate equipment. Once all of the components arrive and are unpacked, the system developers would need to configure the hardware portion of the system and test that each component is functioning properly. Due to prolonged delivery dates by commercial vendors, AMS estimates this task should require six weeks.

Task 2. Bulletin Board System Configuration

The second task, which begins after the completion of task 1, involves loading the BBS software onto the RIMS system and customizing the user interface to conform with RIMS software requirements. This customization includes creating post offices for DELEP partners (e.g., committee members and key data providers) and establishing mailing lists. AMS estimates this task should require four weeks.

Task 3. Data Source Index Development

The third task, which begins after the completion of task 1 and runs concurrently with tasks 2 and 4, designs and develops the data source index application using a UNIX scripting language such as C-Shell. AMS estimates this task should require twelve weeks.

Task 4. Data Depot Implementation

The fourth task, which begins after the completion of task 1 and runs concurrently with tasks 2 and 3, designs and develops the electronic access to the data depot including a national database data access utility. This component can also be implemented using the C-Shell scripting language. AMS estimates this task will require eleven weeks. To complete this task, the data manager will need to work with the system developers to identify key data sets.

Task 5. Data/System Management Utilities Development

The fifth task develops all of the data and system management utilities necessary to aid the data manager in maintaining the RIMS system. AMS estimates this task should require three weeks.

Task 6. RIMS Testing and Installation

The sixth task, which begins once all previous tasks are completed, provides comprehensive testing of RIMS and installs RIMS at DELEP. AMS estimates this task should require four weeks.

Financial and Staffing Requirements

The costs for RIMS fall into two major categories: system development and service maintenance. The system development costs are paid once. The maintenance costs will be incurred each year.

System Development

AMS believes the total cost for system development is \$220,000. This total includes purchasing hardware and software, developing customized software, and integrating the system components. Because some of the development tasks can be performed concurrently, AMS believes the entire development cycle should require only six months. *Table 2: RIMS Implementation Schedule* presents a schedule for completing each task, illustrates where some tasks overlap, and provides a cost estimate for the particular task.

Table 2: RIMS Implementation Schedule

Task	Month #1				Month #2				Month #3				Month #4				Month #5				Month #6				Total Cost
1.0	■	■	■	■	■	■	■	■																	62,000
2.0							■	■	■	■															18,000
3.0							■	■	■	■	■	■	■	■	■	■	■								55,000
4.0							■	■	■	■	■	■	■	■	■	■									45,000
5.0																	■	■	■						15,000
6.0																					■	■	■	■	25,000
Total																									220,000

Service Maintenance

In addition to the system development cost, DELEP must provide an annual maintenance budget. To support DELEP's long-range planning needs, AMS prepared an estimate to cover the service's annual costs. The budget estimate is based on three assumptions: (1) DELEP will implement the variation of the basic RIMS architecture that AMS recommended above; (2) the number of annual users and RIMS staff will remain constant; and (3) DELEP will secure office space for free from a state or federal agency. In fact, DELEP's annual maintenance expenses will fluctuate over time in proportion to the number of users and range of system functions. Nonetheless, the annual budget estimate in *Table 3* below should provide a reasonable basis for DELEP to begin formulating a long-term budget.

Table 3: Annual Maintenance Cost Estimate

Cost Category	\$ Amount
Compensation:	
<i>Data Manager's salary</i>	40,000
<i>System Administrator's salary</i> ¹	<u>25,000</u>
Subtotal	65,000
Benefits:	
30 percent of total compensation	19,500
System maintenance:	
<i>Phone service: 2 direct & 6 WATTS (1/modem)</i> ²	24,000
<i>Hardware maintenance fees</i>	4,500
<i>Software maintenance fees</i>	<u>400</u>
Subtotal	28,900
General Office Expenses:	
<i>Xerox, phones, fax leases</i>	1,600
<i>Paper</i>	500
<i>Floppy disks</i>	500
<i>Postage: 1,000 packages @ \$0.50</i>	500
<i>Miscellaneous</i>	<u>3,500</u>
Subtotal	6,600
Grand total	\$120,000

- 1 Depending on the technical support the data manger requires, DELEP could reduce this cost by employing a part-time system administrator or obtaining contractors as needed.
- 2 This figure includes the cost of basic phone service, long-distance calls for the data manager and approximately 230,000 minutes of communication time over the system's 6 modems at a rate of \$0.10 per minute. DELEP could substantially reduce this figure by eliminating the WATTS lines for the system's modems.

Over 60% of this budget is for staffing. The following describes the responsibilities of these staff positions. Additional discussion about staffing is provided in Appendix B.

- Data Manager. The data manager will oversee the operation, maintenance, and planning of RIMS. The data manager will coordinate all DELEP data management activities and manage all communication with data providers, users, and other members of the DELEP data management community. These responsibilities will include the daily maintenance of RIMS and assisting users with data interpretation.
- System Administrator. This staff person will be responsible for the technical issues associated with DELEP data management, including the maintenance of the data source index and data depot.

Advantages of this Implementation

The proposed implementation of RIMS addresses the major critical success factors: facilitate and promote data access and exchange, provide information and assistance in a cost-effective manner, and monitor progress and evolve accordingly. Most importantly, this solution includes software that allows users to access information about data (e.g., data source index) and promote data access exchange by publicizing the data's availability (e.g., data source index and bulletin board system). In addition, many features (e.g., ability to access data directly from the data depot) utilize technology to implement RIMS in a cost-effective manner. If DELEP did not provide this direct access, DELEP would need to purchase additional floppy disks and incur mailing costs which would increase the annual budget. Moreover, the implementation strategy provides DELEP the capability to monitor progress and evolve when necessary. This feature is evident in the standard data/system management utilities and the capability to integrate future enhancements. Below is a summary of one such enhancement.

One major advantage to this implementation is the room for growth. After using RIMS for a period of time, DELEP may want to provide additional functionality. For example, as users start analyzing data in the region, many individuals may need data in a different format or would like to visualize where the data were collected. RIMS could support this additional functionality by incorporating a data window into the software suggested in the implementation strategy. This data window would 1) store graphic files that show where data were collected for a particular data source and 2) provide minimal data translation capabilities (e.g., ARC/INFO coverages to ASCII text files).

AMS recommends that DELEP consider three reasons to provide this additional capability.

- ☐ The data manager may want to visualize the data he is organizing. Since Delaware estuary data is geographic in nature, the ability to visualize the data will probably improve the data manager's overall effectiveness.
- ☐ Data users would certainly appreciate being able to see where the data they are requesting came from.
- ☐ RIMS users may not have the available hardware and software to make data translations themselves (i.e., coverages to spreadsheets)

If DELEP believes that these capabilities are already needed, the data window could be implemented now. Otherwise, these components could be added at a later date. The additional cost of this enhancement would be \$60,000 (approximately \$10,000 for ARC/INFO and \$50,000 for system development).

In addition to development costs, the annual operating budget would also moderately increase. While the utilities for creating the graphics and translating the data are automated, the increased costs may result from:

- ☐ An increased user demand which requires additional modems
- ☐ Annual maintenance fee for ARC/INFO

VII. Conclusion

Based on the requirements analysis and design implications, AMS believes the conceptual model for RIMS should provide material value to the Delaware estuary community. For example, it can assist local government and industry in locating databases for permit applications. To implement the conceptual model, AMS recommends customizing a commercially available bulletin board system and developing a customized data source index from a standard database application. To adequately support the software architecture, AMS believes the centralized electronic system should support the following functions.

- ☐ Help users to easily identify data sources and request information
- ☐ Enable data providers to send files electronically to data users per individual requests
- ☐ Provide on-line access to a limited number of frequently requested data sources
- ☐ Provide an interface that will facilitate downloading selected data files from national databases
- ☐ Support limited translation of the data files which the system downloads from the national databases
- ☐ Facilitate communications among DELEP's partners

AMS believes RIMS should be developed on a RS6000 workstation in order to allow future upgrades. In addition to the hardware, RIMS should include the following software components:

- ☐ Bulletin Board System
- ☐ Data Source Index
- ☐ Data Depot
- ☐ Data/System Management Utilities

Therefore, AMS estimates the development cycle will take **six months** and cost **\$220,000** including purchasing the necessary hardware and software. After DELEP implements RIMS, AMS estimates the long-term costs to manage the system will be **\$120,000 per year**.



DELAWARE

ESTUARY PROGRAM

Appendices

Data Management Plan

A. Project Summary

The design of a RIMS conceptual model and assessment of RIMS functional capabilities were used to develop the data management plan for Delaware estuary program. The plan, presented in the body of this report, recommends how to implement RIMS including system architecture, development tasks, long-term maintenance expenses, and staffing requirements.

AMS used a two-phase study to design a RIMS for the DELEP. This study was sponsored by the Scientific and Technical Committee of DELEP and conducted by American Management Systems, Inc. (AMS). As shown, this project was conducted in two phases:

- Phase I - Development of RIMS Conceptual Model. During phase one, AMS conducted a user survey and organized two Joint Application Design (JAD) sessions in order to develop a series of interim conceptual models for the Regional Information Management Service.
- Phase II - Functional Assessment of RIMS Model. During phase two of this project, AMS conducted a survey of DELEP data providers, a research and data collection project, and a data management workshop to test the feasibility of the RIMS model.

This appendix is divided into five sections. The first two sections, user survey and JAD sessions, correspond to Phase I. The sections related to Phase II include: data provider survey, research and data collection project, and data management plan.

User Survey

AMS conducted a survey to obtain the data management needs of the DELEP community as the first step toward designing RIMS. A questionnaire was mailed to 473 individuals, including all 346 members of the DELEP Scientific & Technical Advisory Committee (STAC) and 127 additional contacts provided by members of the Data Management Committee.

AMS received responses from 76 people associated with various organizations. Almost one-quarter of the responses were from state agencies (e.g., PADER, NJDEPE, DNREC). Over 15% of the total responses came from local government agencies, and another 15% were from federal agencies such as EPA, NOAA, USFWS, and USGS. Specifically, the responses can be broken into the following categories:

- 25 from state government agencies
- 12 from local government agencies
- 12 from Federal government agencies
- 8 from private engineering & consulting firms
- 6 from educational institutions
- 6 from other organizations
- 5 from nonprofit environmental organizations
- 2 from utility companies

Since the respondents represented a diverse group of organizations, their reasons for needing access to data varied. The most commonly cited reasons for needing access to data about the Delaware estuary were to conduct research, resource management, monitoring program design and evaluations. Other interests for DELEP data included enforcement of regulations, education, issuance of permits, and environmental advocacy. Some of the less frequently mentioned purposes included local and regional planning, environmental review and assessment, conservation management, resource protection analysis, land use planning outreach, oil spill/hazardous materials response, and permit review.

Obstacles to Obtaining DELEP Data

The survey responses also identified obstacles that users currently encounter when attempting to locate and obtain data sources. The following list ranks the most commonly experienced data access problems:

1. Limited knowledge of available data. Awareness of the available data on the Delaware Estuary varied widely across the users surveyed. Most users were not as aware as they would like to be about the data that is available for the Delaware Estuary.
2. Limited information about how to access data. In addition to a lack of knowledge about data sources, most respondents did not know how to access that data.

3. Limited QA/QC information available for data sources. Limited awareness of the procedures used to ensure the quality of DELEP data compounds the data management problems among the user community. An uncertainty about QA/QC procedures contributes to a lack of confidence in DELEP data.
4. Incompatible data formats. The variety of possible formats for data contributed to compatibility problems. Significant differences in data collection and sampling strategies also prohibit the integration and use of DELEP data.
5. Insufficient documentation regarding methodology/design. The lack of concise documentation on sampling and collection methodologies was also cited by respondents as another barrier to the use of DELEP data.
6. Slow response to requests for data. The amount of time required to obtain data as well as the slow response time once a request was made also ranked highly among the other problems associated with DELEP data cited by respondents.

Other data access problems included data release restrictions, the inability to conduct estuary-wide analysis, the lack of computer knowledge and available in-house equipment to store and manipulate data, a limited number of spatial/temporal resolution of data sets, and difficulty with data interpretation.

Suggested Capabilities

Respondents suggested ways RIMS could help resolve these data access problems. The following RIMS capabilities were noted as among the most useful for facilitating access to environmental and land use data:

1. Information on how to retrieve data. RIMS needs to provide concise instructions for retrieving DELEP data across data maintenance organizations (including USGS, EPA, and the States).
2. Information on where data are stored. RIMS needs to disseminate information on the precise physical and organizational locations of DELEP data sources.
3. On-line access to all data sources. RIMS needs to consider on-line access to all DELEP data sources, where feasible.
4. Information on sampling methodologies. RIMS must also provide the DELEP user community with precise information on the data collection and sampling methodologies used when assembling data sets. RIMS may also want to consider providing information on sampling parameters, study area, and other details related to sampling protocols.

5. DELEP data manager. RIMS must support a DELEP data manager who is ultimately responsible for the operation of RIMS and the management of its resident data sources, index, and user services.
6. On-line access to some data sources. Some respondents believed that RIMS must accommodate access to only those data sources designated as core by the DELEP user community.
7. QA/QC information about data sources. In addition to providing details on data retrieval, storage, and sampling methodologies, RIMS must also provide its user community with information about the quality assurance/quality control procedures used when collecting and analyzing data.
8. Information about the hardware and software needed to access data. RIMS must also provide specific information about the hardware and software necessary to access and manipulate DELEP data.

Data of Interest

The survey also asked the respondents to indicate the types of data they were interested in. The types of data sources were divided into six categories: locational, cultural, physical, loading, biological, and land use. The table below summarizes the interest expressed in each of these categories. For instance, there were three types of locational data included on the survey. The number of respondents expressing interest in each of the three types of data was 48, 38 and 34. The most commonly selected locational data type was of interest to 48 respondents. As a result, the average number of respondents interested in locational data was 40.

Category	# of Data Types Within Category	Avg. # of Respondents Expressing Interest	Standard Deviation	Max.	Min.
LOCATIONAL	3	40.00	7.21	48	34
CULTURAL	2	39.00	2.83	41	37
PHYSICAL	17	37.82	12.34	65	11
LOADING	7	37.57	10.31	47	24
BIOLOGICAL	24	35.00	11.35	52	10
LAND USE	20	25.45	10.86	45	10
PUBLIC HEALTH	6	23.17	5.81	28	14

The findings from the user survey were instrumental in the development of a workable RIMS model. The survey identified potential RIMS users, needs for DELEP data, and the level of interest in RIMS throughout the DELEP community. More importantly, the responses also provided insight into the RIMS capabilities that users deem most valuable and the data access obstacles that RIMS must address if it is to be successful.

JAD Sessions

After reviewing the results of the user survey, participants at the first JAD session identified several objectives which will be critical to the success of RIMS. Defining critical success factors helps to focus resources on the most important project areas by highlighting key information needs, determining pivotal decision points for the project, and defining assumptions that require review. According to the critical success factors, RIMS should:

- Facilitate and promote data access and exchange
- Provide information and assistance to users in a cost-effective manner
- Be designed with the capability to monitor progress, successes, and failures and evolve accordingly
- Allow its goals and implementation to become part of the CCMP
- Include information about data in both electronic and non-electronic formats (e.g., gray literature, reports).
- Be easily accessible to users on multiple platforms.
- Include a data manager who is knowledgeable about regional data sources and experienced in facilitating data exchange.
- Be visible and easily accessible to the public (e.g., available at public libraries, listed in the blue pages).

These critical success factors should be used to guide RIMS design and development efforts and ensure that the service accomplishes its overall goals. In fact, these factors describe the basic elements of RIMS that must be operational if RIMS is to be true to its design and, ultimately, valuable to its user community. These components also helped to validate a variety of models envisioned through the development process. Although the service's effectiveness is largely measured by the degree to which it is used, RIMS should help the DELEP data management community acquire and analyze more data more efficiently. Indeed, RIMS should decrease the community's overall cost of obtaining data by reducing redundant collection activities. RIMS should also increase the benefit of previous investments, by making data more readily available for re-use.

RIMS will facilitate and promote data sharing by addressing the following minimum criteria:

- Public visibility
- Technical architecture that provides access to potential users on multiple platforms
- Functional design that supplies information about data in various electronic and hard copy forms
- Professional staff (i.e., a data manager) who is knowledgeable about regional data sources and experienced in data exchange

In order to maximize the system's effectiveness, RIMS must simultaneously satisfy the above criteria and

- Provide information and assistance to users in a cost-effective manner
- Monitor progress, successes, and failures and evolve accordingly
- Ensure consistency with DELEP's CCMP

Based on initial requirements defined by DELEP, the critical success factors, and the results of the user analysis, AMS presented an initial model at the first JAD session. The model included both human and electronic functions as shown in *Figure 1*. In the diagram, the 3-D box represents the electronic component and the RIMS data manager performs the human functions for the service. The regional data providers and RIMS users are members of the DELEP data community.

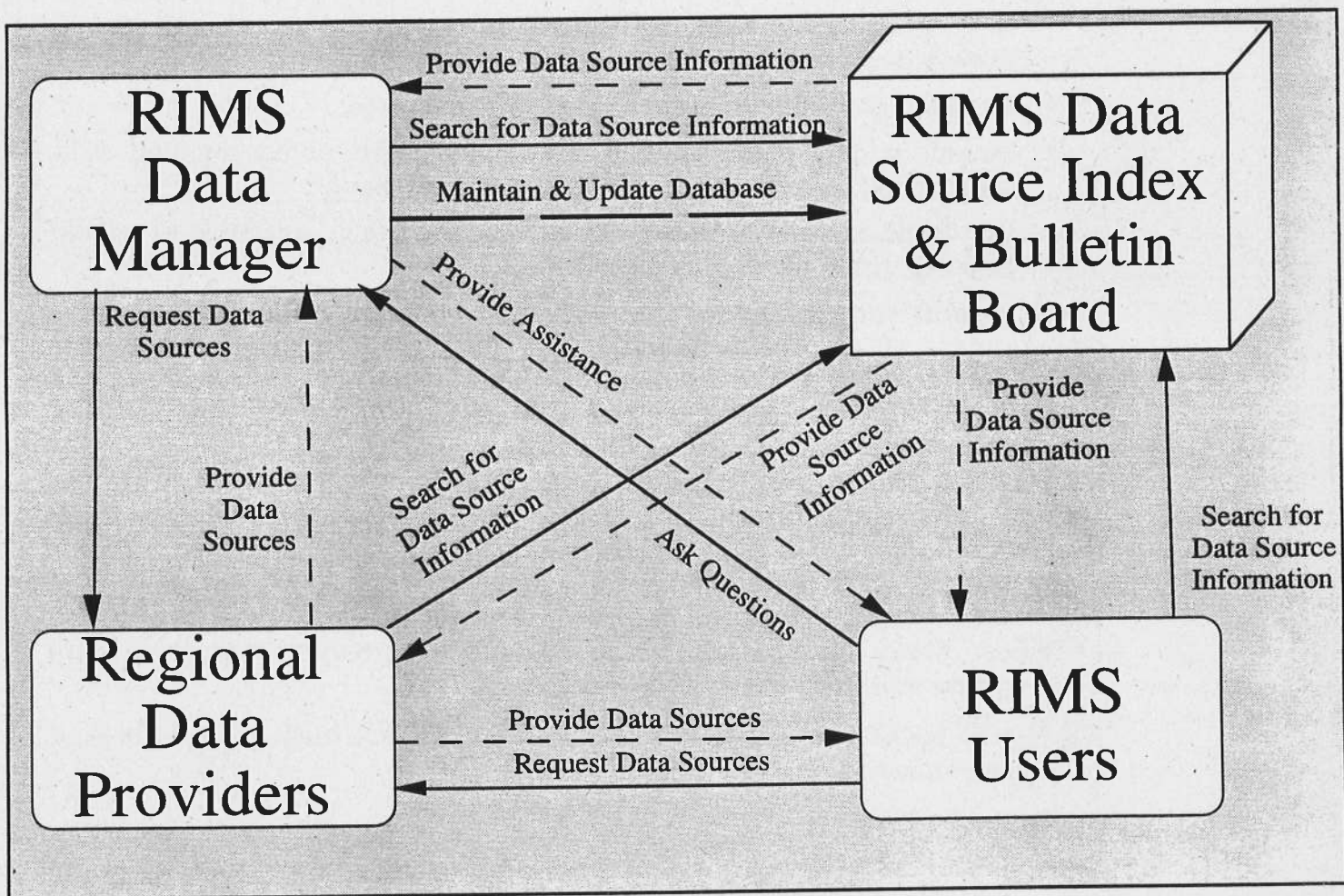


Figure 1: Initial Model

In this model, RIMS users access the RIMS data source index and bulletin board to determine what data sources were available. To access the data sets, the user would contact the regional data provider directly. The RIMS data manager would be available to answer both system and scientific question.

The data provider is responsible for submitting the RIMS data manager with up-to-date descriptions of available data sources and providing users with actual data sources. In this diagram, the data provider interacts with the data source index and bulletin board in the same fashion as the RIMS user.

Based on this design, the data manager's role was limited to providing assistance to users, obtaining data sources from providers, and maintaining the RIMS data source index and bulletin board system.

Using the input from the first session along with the system objectives, AMS modified the conceptual model. The modified model, shown in *Figure 2*, was presented at the second JAD session. This model varies from the previous example in the following ways:

- Addition of a Data Depot which can store copies of frequently requested data sources
- Users can request data from either the Data Provider or Data Manager

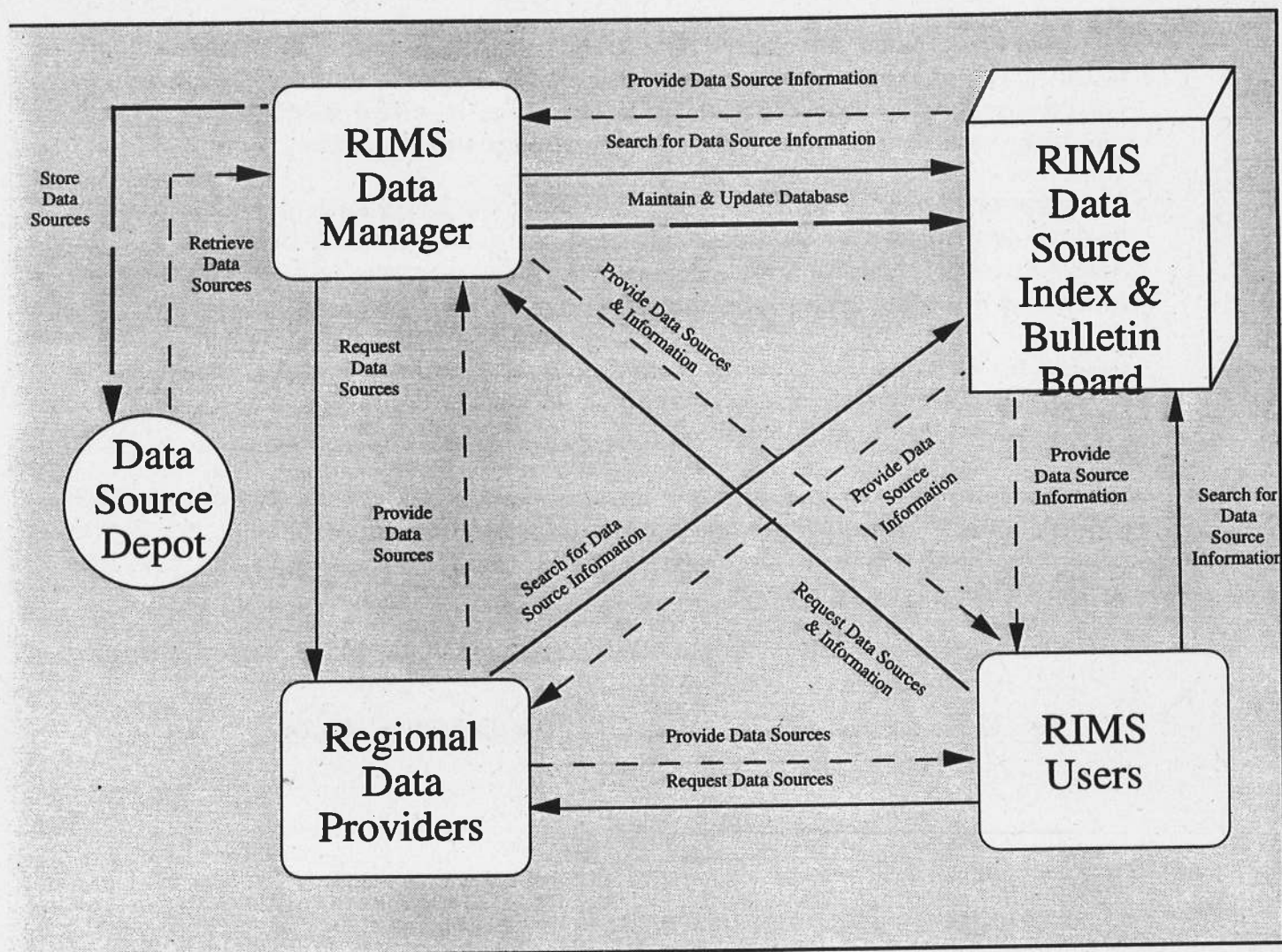


Figure 2: Modified Model

Using the models in Figure 1 and Figure 2, AMS finalized the conceptual model. Each component and the corresponding interactions are discussed further in Appendix B.

The following participants attended the first JAD session, provided insights into the roles and functions of each component, and suggested possible modifications:

Bob Nyman	U.S. EPA, Region II
Bruce Hargreaves	Lehigh University
Harvey Simmon	U.S. EPA, Region II
Larry Thornton	NJ-DEPE (GIS)
Jim Walsh	PADER
John Hines	PADER
Gregory Breese	USFWS
Carmen Zappile	Army Corps of Engineers
Rick Truitt	Delaware, DNREC
Steve Hammell	U.S. EPA, Region III
David Wrazien	USFWS
David Racca	Water Resources Agency
Warren Huff	DRBC
Joseph Davis	U.S. EPA, Region III (retired)

The following is a list of participants from the second session.

Richard Albert	DRBC
Leslie Andersen	DNREC
Rich Brahler	Bucks County Planning Commission
Ken Conrow	New Jersey Department of Transportation
Joseph Davis	U.S. EPA, Region III (retired)
John Defriece	DNREC
Bruce Hargreaves	Lehigh University
Bob Nyman	U.S. EPA, Region II
Michael Ontko	Delaware Valley Regional Planning Commission
Donna Randall	LMS Engineers
Larry Thornton	NJ-DEPE (GIS)
Oliver Weatherbee	University of Delaware
Christopher Willems	New Jersey State Aquarium
Karen Wurst	NOAA/NMFS

Data Provider Survey

As part of this survey, AMS described the conceptual model of RIMS and asked recipients to state whether they would use RIMS, how many requests they currently receive, what types of data they have, and other basic questions. A summary of responses are provided below. Actual responses are provided in tables in Appendix E.

AMS distributed the survey to 54 individuals and received 27 responses (50% response rate). Respondents were asked whether they thought RIMS would be successful. Over 85% believed it would be a success. Below is a breakdown of the type of organizations that responded to the survey.

Type of Organization	Frequency	Percent
Educational Inst.	4	14.8
Federal Gov't	6	22.2
Local Gov't	3	11.1
Private Ind.	6	22.2
Regional Org.	1	3.7
State Gov't	7	25.9

The majority of data described in the data provider survey was biological closely followed by water quality. Below is a breakdown of data categories mentioned on the survey.

Category	Frequency	Percent
Administrative	1	3.7
Biological	10	37.0
Cultural	3	11.1
Regulatory	1	3.7
Utilities	3	11.1
Water	9	33.3

Of the respondents, 82% stated that they would use RIMS to access data from other organizations. Below is a table that shows the breakdown of those organizations that would use RIMS (yes) and those who would not (no).

Organization	Yes	No
Educational Inst.	3	2
Federal Gov't	5	1
Local Gov't	2	1
Private Ind.	4	1
Regional Org.	1	0
State Gov't	7	0
TOTAL	22	5

Moreover, 75% of these organizations stated that they would provide electronic descriptions of their data to populate the Data Source Index. The following breakdown shows which organizations plan to participate (yes) and which organization do not plan to provide abstracts (no) for the Data Source Index.

<u>Organization</u>	<u>Yes</u>	<u>No</u>
Educational Inst.	4	0
Federal Gov't	3	2
Local Gov't	2	1
Private Ind.	4	1
Regional Org.	1	0
State Gov't	7	2
TOTAL	21	6

The following table shows what types of organizations currently request data. An 'x' is used to represent that a particular type of organization requests data from the respondents. The number equates to the number of organizations that receive requests from that combination of organizations. Ten organizations do not currently receive requests.

<u>Federal</u>	<u>State</u>	<u>Local</u>	<u>Private</u>	<u>Education</u>	<u>#</u>
x					1
x	x				3
x	x		x		1
x	x	x	x		2
x	x		x	x	2
x	x	x	x	x	1
	x	x			1
	x	x	x		2
		x			1
			x		3

The organizations receive approximately 9,000 data requests a year. For a particular organization, the number of requests could be as low as 2 per year and as great as 7,800. With local government receiving the most requests.

Data Collection and Research Project

In order to determine the feasibility of RIMS, DELEP asked AMS to contact various organizations and determine 1) the type of response users currently receive when accessing DELEP data and 2) how RIMS can solve those problems.

DELEP worked with AMS to structure a research project to test the RIMS model. Over a two week period in December of 1993, representatives from AMS called about a dozen data providers (as designated by DELEP) to collect nitrogen loading data. In particular, AMS analysts, posing as DELEP researchers, asked for available nitrogen load data from 1988 to the present. The DELEP data management committee defined the study area as the Ben Franklin Bridge south to the C&D Canal.

The study confirmed the assumption that data identification is the most difficult phase of data access in the region. Through this study, AMS found that several data sets reside on STORET. This fact was re-enforced during the Data Management Workshop later in the project. Since the majority of the data reside in a single database, analysis of the information is simplified. However, several people have problems interpreting the STORET parameters scheme. RIMS can assist users in accessing these data sets by providing a mechanism that describes STORET data and how to access that information. Other providers mailed copies of documentation and hardcopy of reports. Upon review of multi-volume publications, data users request specific data sets. AMS believes RIMS could assist users by providing descriptions of these data sets electronically. Users can search for key words and locate data sets in a more time efficient manner. In general, providers did supplement data with written documentation and use of data was fairly straight-forward. The challenge for RIMS will be to provide the documentation electronically so users can search the index and easily identify data sets.

Below is a summary of the phone calls and data provider's reactions. Additional conclusions from this part of the study are provided in Appendix B: Feasibility Report.

1.a. USGS (DE)	(302) 739-4000
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Dates Called	12/17, 21
Contact/Phone	Robert H. (Bob) Simmons (302) 734-2506
Data Requested	USGS Streamflow from 8 gaging stations network in Delaware study that began in 1943.
Summary of AMS Actions	<ul style="list-style-type: none"> ■ Called 12/17 - wrong number, tried information. ■ Returned call on 12/21 ■ USGS (DE) does not sample in the Bay (USGS-PA may have stations in the Bay) ■ Has streamflow data ■ Will send daily discharge data tables (hardcopies) from major streams ■ Must contact Melbourne, PA office for data from Bay-based sampling stations

1.b. Melbourne, PA USGS	(215) 647-9008
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Dates Called	12/20
Contact/Phone	Tom White (215) 647-9008
Data Requested	<ul style="list-style-type: none"> ■ Have streamflow and water quality data on three sampling stations in the Bay (at the Ben Franklin bridge, Chester, and Reedy Island from around 1965) ■ Must obtain automated copies from USGS Lemoyne office public information officer
Summary of AMS Actions	<ul style="list-style-type: none"> ■ Contacted Lemoyne office (1.c.)

1.c. Lemoyne, PA USGS (717) 730-6916

Dates Called	12/20
Contact/Phone	Bob Helm (717) 730-6916, fax: (717) 730-6997
Data Requested	<ul style="list-style-type: none">■ Must fax a request for data to: District Chief USGS-WRD 840 Market Street Lemoyne, PA 17043■ Volume I: Delaware Basin■ Volume II: Susquehanna Basin■ Volume III: Ohio Basin
Summary of AMS Actions	<ul style="list-style-type: none">■ Sent a fax to Helm for <i>Annual Water Resources Data Report (1992) Volume I (for Delaware)</i>■ Will follow-up with Helm once I pursue the hardcopy of water resources report■ Document received at AMS 12/22/94

1.d. Towson, MD USGS (410) 828-1535

Dates Called	12/20, 12/22
Contact/Phone	Lillian Maclin (410) 828-1535, fax: (410) 828-1538
Data Requested	<ul style="list-style-type: none">■ Delaware Bay streamflow data.
Summary of AMS Actions	<ul style="list-style-type: none">■ Sent fax on 12/21 for automated copies of DE Bay streamflow data.■ Package will include WA data and mean daily discharge data (month, day, mean value)■ Files will be provide in flat files - one with parameter codes, and one with site file■ Maclin called AMS after receiving our faxed request

Dates Called	Called 12/17 and left message.
Contact/Phone	Ed Pustay
Data Requested & Summary of Actions	1) USGS NJ Stream flow gaging stations network (48 streamflow stations) began in 1943.**

Notes:

PA collects this information for stations south of Trenton. NJ maintains all data in hard copy, but need to call PA for disk copy.

- 2) National Stream Quality Accounting Network (NASQUAN)- 2 stations— began in 1973**

Notes:

PA collects this information for stations south of Trenton. NJ maintains all data in hard copy, but need to call PA for disk copy. However, there is some question as to whether NJ would have any data in our study area b/c the Bridge is below Trenton.

- 3) NJ Geological Survey Radiochemical Program network for radioisotopes—began in 1973

Notes:

The contact, Ed Pustay, claims that he is not the contact, and that the state of NJ is the contact. NJ claims to have never heard of this program.

Contact: Bill Bauersfield

- 1) National Hydrologic Bench-mark Program began in 1964. One station.

3. USGS (PA) (215) 647-9008	
Dates Called	12/17, fax: 12/21
Contact/Phone	Charles Wood (215) 647-9008, fax: (215) 647-4594
Data Requested	<p>1) USGS PA streamflow gaging stations network, which is part of the National Water Data systems, began in 1890. 105 stations.</p> <p>Notes:</p> <p>Spoke with Charles Wood, but need to submit request in writing. Faxed written request to Wood.</p> <p>2) National Stream Quality Accounting Network (NASQUAN) in PA, 1 station at Fairmount Dam in Philadelphia. Began in 1963</p> <p>Notes:</p> <p>Wood was very cooperative and helpful (talked to 45 minutes). He thought our study had many flaws and asked plenty of questions. He is sending hard copy data, but to obtain disks, we need to send a formal request for the data to him at:</p> <p>USGS 111 Great Valley Parkway Malvern, PA 19355</p> <p>He said it would probably cost between \$25 - 100. He wants us to be very specific as to the types of data and parameters, years, location, etc. He wants specifics, and says that hydrologic is too broad and it would be too much for us to handle. (We asked for precipitation and streamflow data)</p> <p>Contact: Andrew Reif</p> <p>3) USGS -PA Fall Water Quality Monitoring Program published in Water Resource Data Volume 1. 39 miscellaneous sites</p>
Summary of AMS Actions	<p>■ Must submit written request for automated data - faxed request on 12/21</p>

4. DE Dept of Environmental Resources	(302) 739-4403
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Dates Called	12/21
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Contact/Phone	Dick Gardner (302) 739-4771 Caroline Otto (302) 739-4771 Paul Scaley (609) 883-9500 (x251)
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Data Requested	DE Ambient Surface Water Monitoring network - data from all three components (RIBS, SS and FSMN) began in early 1970s. approx. 90 stations. STORET data for sampling stations in study area. DENREC has combined nitrogen data, weather observations, tidal and flow data, as well as temperature, ph, and chloride. They can provide this data in ASCII or spreadsheet format.
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Summary of AMS Actions	■ Sent fax (12/21) to request data to C. Otto. ■ Otto returned call (12/28) and transferred our request to Paul Scaley.
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5. Penn Dept of
Environmental
Resources

(717) 783-2300

Dates Called

12/21

Contact/Phone

Richard (Rick) Shertzer (717) 783-3638
Tammy Schreffler (data person)

Data Requested

STORET Data from PA Water Quality Network -
27 stations, began in 1962

Summary of AMS
Actions

- Left message 12/21 for T. Schreffler, no response
- Talked with Rick Shertzer about how data are handled (primarily through STORET)
- Discussed current PA DER data systems with Rod Kime
- To use data, you can use STORET directly or T. Schreffler can provide a diskette with the requested information

6. Delaware River & Bay
Authority (DRBA)

(302) 571-6303
(800) 343-DRBA

Dates Called

12/21

Contact/Phone

None yet

Data Requested

Delaware Estuary Cooperative Monitoring
Program

Summary of AMS
Actions

- Wrong phone number given initially
- Called DRBA - No one has heard of the Delaware Estuary Cooperative Monitoring Program (began in 1967).
- DECMP meets monthly at DRBA building. Danielle, who books the room, will call back with a contact and phone number for DECMP.
- No response

7. NOAA North
Carolina

(704) 271-4800

Dates Called

12/21

Contact/Phone

John Cobar (704) 271-4800
fax: (704) 271-4876

Data Requested

Requested documentation on:
1) Delaware NOAA NWS Climatological Data Network. Six stations in DE Bay, and one LCD station in Wilmington. Began in 1910.
2) New Jersey NOAA NWS Climatological Data network. 13 stations in DE drainage basin in NJ. Began in 1910.

Summary of AMS
Actions

- Spoke with John Cobar about data. He has weekly and sometimes daily precipitation numbers (including temperature).
 - Requested documentation - will develop precise request for data once I see his documentation
 - National Climatic Data Center
Federal Building
37 Battery Park Avenue
Ashville, NC 28801-2733
 - Data will cost money depending on the complexity of the search.
-

Data Management Workshop

During a presentation to DELEP's STAC members, AMS was asked how RIMS users would access data stored nationally in STORET, an EPA water quality database. To ensure users could retrieve historical data, AMS conducted a data management workshop to demonstrate the ODES/STORET Bridge and discuss data access problems. The following is a list of comments from that workshop.

- Users should have the ability to access RIMS through modem or Internet. Please note that DELEP will need to incorporate additional security features if Internet access is provided.
- RIMS should provide customized help menus to assist users with STORET terms.
- Data depot should provide some type of access to ODES and STORET, possibly by providing copies of key datasets.
- The ODES/STORET dictionaries should be less global. Either these dictionaries or RIMS should provide customized menus to help users deal with STORET terms. For example, if a user selects the Delaware estuary program, the dictionaries should only include information for that particular area rather than for the entire country. In other words, the state dictionary should only include Pennsylvania, Delaware, and New Jersey. The agency dictionaries should only include agencies that report data for the geographic area.
- Ideally, you should be able to select stations using maps. In this scenario, the user points to a particular station or groups of stations that are shown graphically on the screen. RIMS responds by describing those stations and the data collected at that location.
- To ensure people can use RIMS, DELEP should develop training workshops and videos. Users who are able to attend a workshop could learn how to use RIMS during a workshop. As part of that workshop, someone would make a video of the session to be distributed to other users who were unable to attend.
- DELEP might also want to distribute a promotional video to make people aware of RIMS and its benefits.
- As part of the ODES/STORET Bridge, Delaware should be described as a polygon rather than the traditional rectangle. Since the bay is so large and slanted, a rectangle must include a large area that is not part of the program. Participants also noted that the monitoring program should be renamed from Delaware to Delaware Estuary.

The following participants attended this workshop:

Bob Nyman: U.S. EPA

Bruce Hargreaves: Lehigh University

Don Stearns: Rutgers University

Joseph Davis: U.S. EPA, retired

Carolyn Otto: DE/DNREC

Bob Connell: NJDEPE

Thomas Fikslin: DRBC

Paul Webber: DRBC

Jonathan Sharp: University of Delaware

Sue Kilham: Drexel University

Richard Albert: DRBC

Bennett Anderson: DE/DNREC

Deborah Watkins: DEPE/BMWC&A

Paul Morton: DEPE/BWM

Warren Huff: DRBC

Bob Kausch: DRBC

B. Feasibility Report

This appendix describes the conceptual model in detail and various design implications. The information is presented in three main sections:

- **RIMS Conceptual Model.** This section includes a discussion of the conceptual model which describes the components of RIMS as well as how the DELEP community will use the service.
- **Functional Assessment.** This section includes a functional assessment of the data providers obtained through Phase II. These activities address whether data providers will use RIMS, to what extent, and what difficulties will users encounter.
- **Feasibility Review.** AMS summarizes the findings and presents various issues that DELEP should consider at this stage of the RIMS development process including a technical evaluation, staffing requirements, financial considerations, and operational issues.

As a result of this project, AMS believes RIMS will provide a valuable resource for DELEP. The conclusions reached in this appendix are a result of project work (Appendix A), discussions with NEPs, and AMS's experience with similar data management systems.

RIMS Conceptual Model

The following model reflects how RIMS should function based on the project work described in Appendix A. As shown in *Figure 1*, the proposed RIMS is composed of three main components: a data manager, a centralized electronic system, and a data depot. The centralized electronic system contains two distinct features: a bulletin board system and data source index. This system, which can be accessed via modem from remote locations, allows users to locate information about available data sources and communicate with other members of the DELEP community. The data depot provides a warehouse of frequently requested data sources. The data manager maintains the data source index, the bulletin board system, and the data depot and also helps users locate and obtain information about data sources.

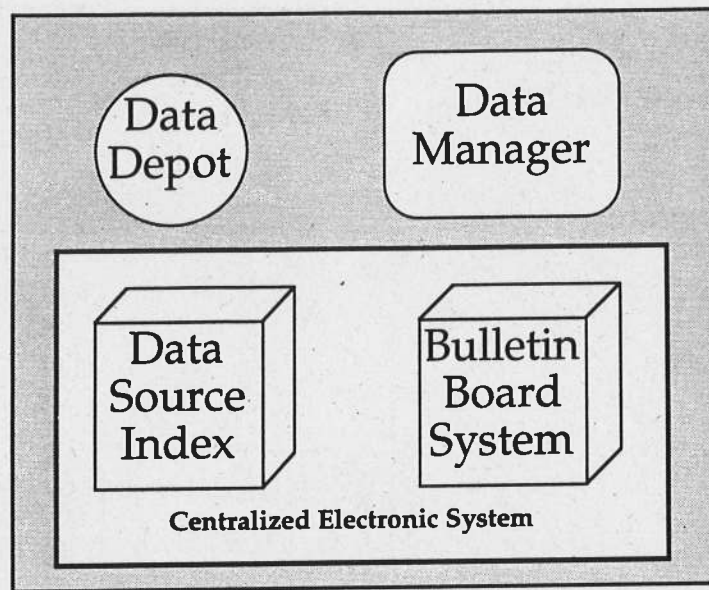


Figure 1: Components of RIMS

Figure 2 depicts the interactions among each of the components of RIMS and the DELEP community. The 3-dimensional boxes represent the features available on the centralized electronic system. The circle depicts the centralized storage center which houses frequently requested copies of both electronic and hard copy data sources. The rectangles with rounded corners represent people: the data manager, the data users, and the data providers. Each component relates with other elements through the actions described on the connecting lines. The solid lines represent requests for information, short dashed lines depict responses to requests, and long dashed lines correspond to maintenance activities. Each of the RIMS components and interactions is described in the following section.

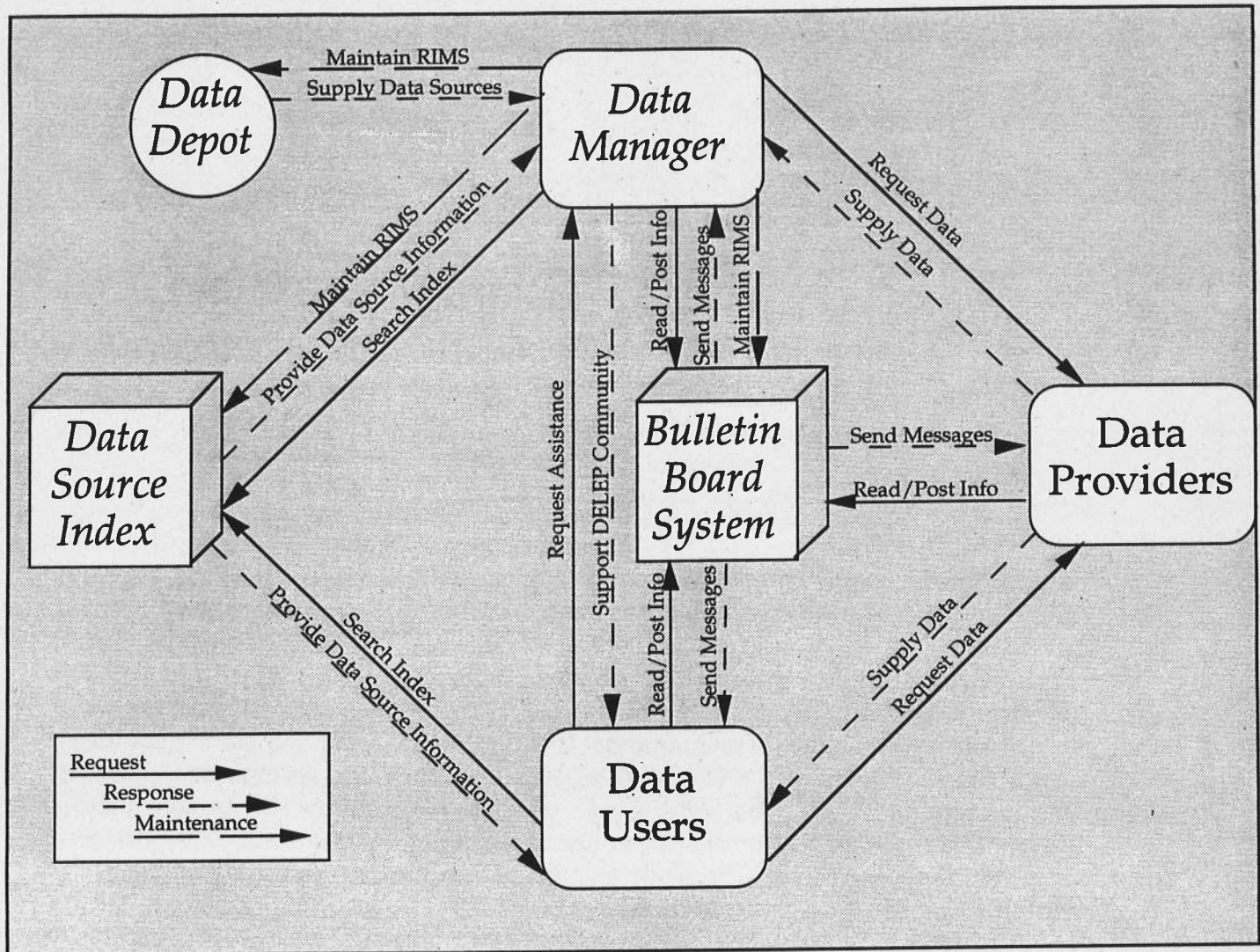


Figure 2: RIMS Conceptual Model

Data Source Index

The RIMS data source index will provide a consolidated register of data sources for the region. The index will contain entries for automated database files as well as for hard copy data sources such as reports and maps. Users will search the index based on keywords to determine important details about data accessibility, formats, and standards. The index will contain a unique reference number and the following standard pieces of information for each data source:

- contact name, address, phone number
- type of data
- format of data
- purpose of study
- keywords relating to data set

In addition to the information above, the data provider will also supply a textual abstract with more detailed information about the source. The contents of the abstract may include:

- the method of georeferencing,
- parameters measured,
- sampling design,
- time period,
- frequency and methodologies,
- quality control measures,
- associated reports and documentation,
- companion studies, access restrictions, and
- GIS/Mapping capabilities.

The flexible format of the information required for the index ensures convenience for data providers when submitting their data to RIMS. The objective is to make these submissions as easy as possible. For example, organizations with their own standard data dictionaries may submit them for inclusion in RIMS with little or no modification.

Bulletin Board System

The RIMS bulletin board will provide a platform for communications among users, data providers, and the data manager. In many instances, the bulletin board will serve as a channel for requesting data sources. For example, data providers who wish to limit phone calls from users may require that all requests for data be made through the RIMS bulletin board. The providers will access the system regularly and respond to requests when it is convenient for them. The bulletin board will also provide a platform for the discussion of data sources, methodologies, study results, and upcoming activities in the Delaware Estuary. Users will be encouraged to use the bulletin board to post analyses of RIMS data sources as well as techniques or tools used for data translation and integration.

Data Depot

The RIMS data depot will consist of a library of data sources stored by the data manager for distribution to others. Data sources may be included in the depot either at the data provider's request (e.g., to limit requests from individual users) or at the data manager's suggestion (e.g., because the data source is frequently accessed). The data source index entries for all sources in the depot will indicate that they may be obtained directly from the data manager. (When distributing data sources from the depot, the data manager will comply with all access restrictions specified by the data provider.)

Data Manager

The Data Manager will be responsible for the overall operation and maintenance of RIMS. The data manager will provide "real-time" supplements to the information provided through the data source index

and bulletin board. Among the other responsibilities of the data manager are helping users locate and obtain data sources, maintaining the electronic data source index, bulletin board (including a user-interface), and the data depot. The data manager will also be expected to conduct outreach activities to increase awareness of RIMS across the DELEP community. The data manager's specific responsibilities are illustrated in *Figure 3* and described in the summary below:

- ☛ **Support the DELEP community.** The data manager will be responsible for providing overall support to the users in the DELEP community. Specific responsibilities include:
 - answering questions about how to access and use the index and bulletin board
 - helping users contact data providers and request data sources
 - assisting users in interpreting information to determine whether a data source will be useful
 - distributing data sources from the data depot
 - working with users to determine levels of satisfaction and areas for improvement
 - conducting outreach to raise consciousness of RIMS (see below)
- ☛ **Maintain RIMS.** Another primary responsibility for the data manager is the operation and maintenance of the Service, including:
 - updating the data source index to include new sources
 - tracking, evaluating, and implementing requested enhancements
 - managing the RIMS bulletin board system
 - keeping a log of RIMS usage
 - developing and maintaining the data depot
 - verifying that the system is functioning properly
- ☛ **Request data.** The data manager must guarantee the consistency of RIMS data sources by:
 - maintaining contact with data providers regarding data source updates and upcoming studies
 - requesting information about data sources from providers
 - obtaining copies of data sources for inclusion in the data depot
- ☛ **Manage data source index.** The integrity of the data source index will be protected if the data manager supports the following activities:
 - locating data source information for members of DELEP community
 - producing summaries of data available in the region
 - performing searches for users with insufficient technical capabilities

- ☛ Read/post information. The data manager needs to act as the central clearinghouse for all DELEP data management activities, including:
 - using the bulletin board system to inform users of enhancements and modifications to the service
 - reading and responding to suggestions and comments posted by data providers and data users
 - distributing studies that have been performed on data sources located using the data source index
- ☛ Conduct front-end outreach tasks. The data manager must be the primary spokesperson for RIMS by:
 - Attending data management workshops and conferences to promote RIMS
 - Writing and distributing outreach materials (including fact sheets and a users guide) to increase the utility of RIMS
 - Writing and distributing a technical newsletter about data management activities across the DELEP community

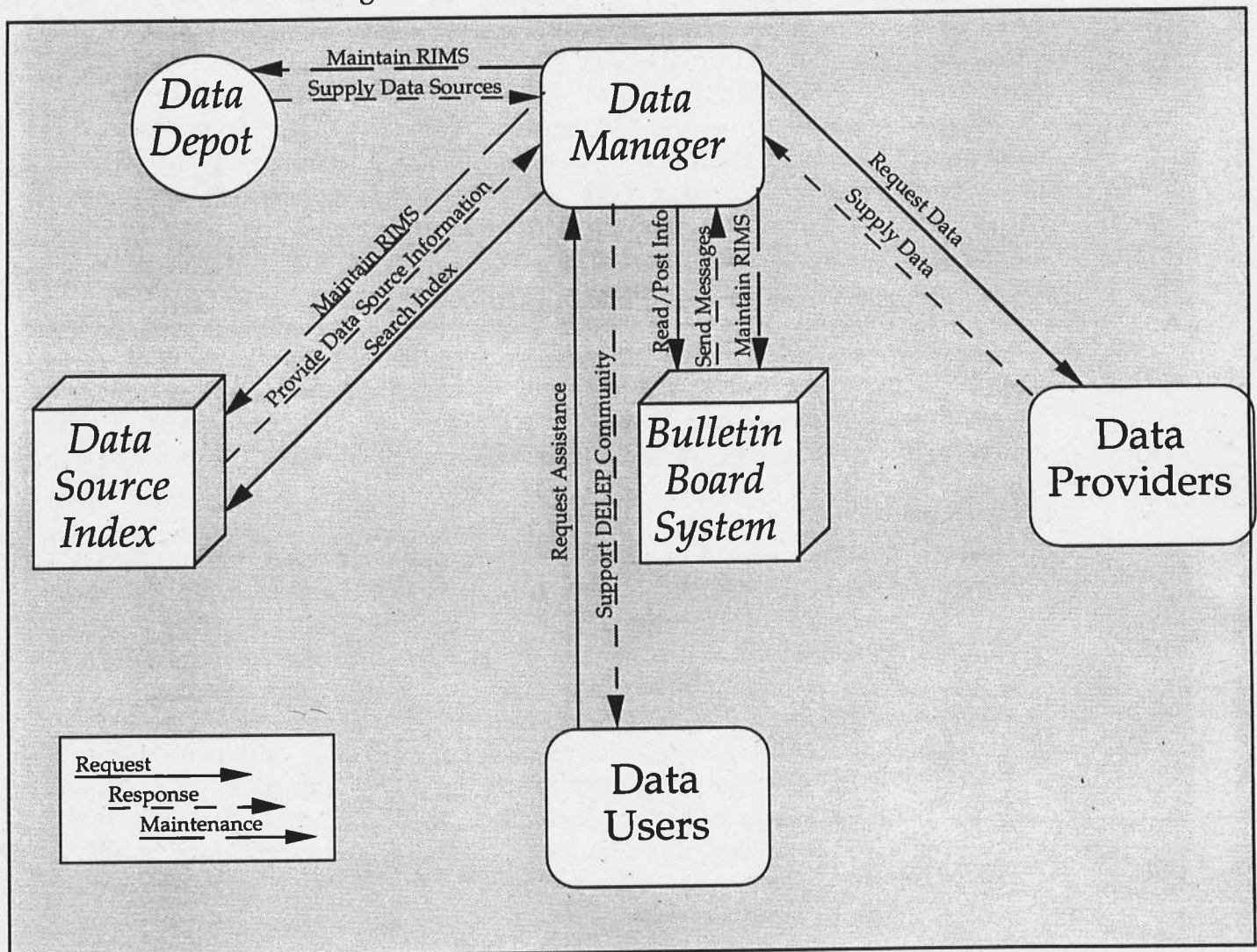


Figure 3: RIMS from the Data Manager's Perspective

The DELEP Data Management Community

The success of RIMS is dependent on the participation of the DELEP community. At the present time, several organizations collect environmental data in the Delaware estuary including:

- County and municipal planners
- Federal, state, and local environmental managers
- Scientists and research organizations
- Educational institutions
- Estuary user groups
- Citizens' groups
- U.S. Environmental Protection Agency
- Trade associations
- Industry groups

In the RIMS model, the community is divided into two major components: data providers and data users. Even though providers and users are separated into distinct groups for the purposes of the RIMS model, a single individual may be a member of both groups. For example, suppose an individual wished to examine trends in dissolved oxygen levels since 1980. The individual has been collecting and storing dissolved oxygen data since 1989, but he needs to access additional data sources to complete his study. Since the individual maintains a small database, he is considered a data provider. He is also a data user because he needs to access another individual's data source. In such a situation, a single individual may act as both a data provider and data user. The following section describes the roles and responsibilities of both of these groups. *Figures 4 and 5* illustrate the relationships as seen by the data provider and data user respectively. The interactions shown in the diagrams are further explained in the corresponding descriptions.

Data Providers

Data providers will supply the data manager with comprehensive information about their data sources. The section entitled "Data Source Index" describes the type of information that should be submitted for each data source. To ensure that the data source index remains up-to-date, the data manager will periodically request that the data providers supply information about new data sources and update information for older data sources if necessary. The data providers will also be called upon to answer questions and respond to requests for data sources from both the data manager and users. To avoid direct requests from users, the data provider may choose to store copies of data sources in the data depot. Each of these activities is depicted in *Figure 4* and summarized below:

☛ Provide data

- answer questions about specific data sets
- provide data sources to data users and the data manager
- submit index information for available data sources

☛ Read/post information

- check for data requests posted on bulletin board system
- learn about studies and reports that used his data

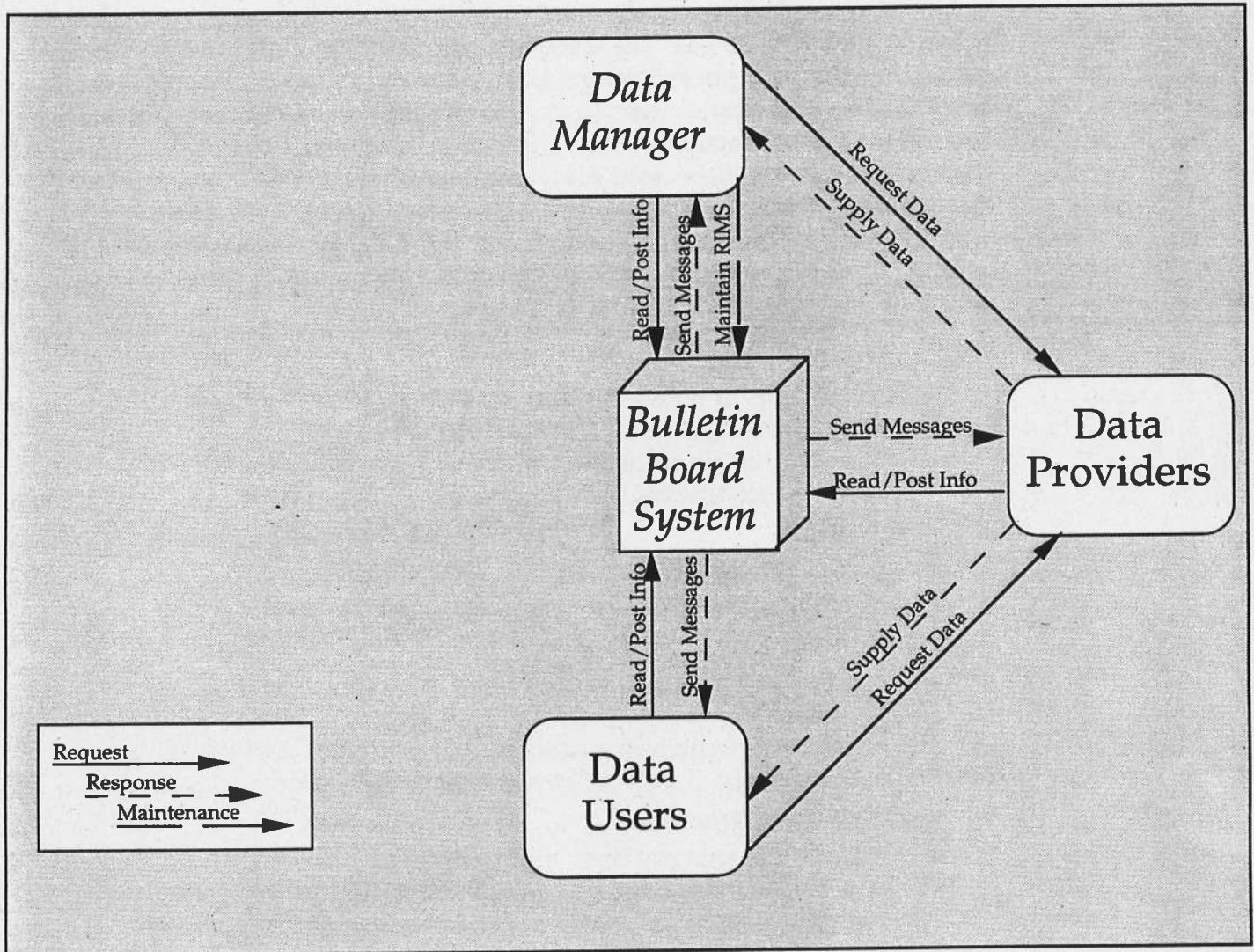


Figure 4: RIMS from a Data Provider's Perspective

Data Users

RIMS will be used to locate and obtain sources of environmental and land use data. To identify data sources of interest, users will search the data source index by keywords. Once the users have located a data source associated with the keywords, they may scan the information provided by the index. Based on the information provided, the users will determine whether data sources are appropriate for their needs. Users may contact data providers to find out additional information, obtain electronic files, or request publications. If the data source is stored in the depot, then the data manager may be contacted to obtain access. Users may post messages on the bulletin board system to report the results of data use (e.g., conclusions drawn, difficulties encountered) to data providers, the data manager, and other users. Throughout all of these activities, users may contact the data manager for assistance using the service. They may also provide the data manager with comments or suggestions for RIMS improvements. In summary, users may employ RIMS for the purposes described below. The activities are illustrated in *Figure 5*.

☛ Request assistance

- ask for help in obtaining data sources
- request data sources stored in the data depot
- obtain technical recommendations about how to access the data source index and bulletin board

☛ Request data

- contact data provider to request a data source
- ask specific questions about a data source of interest

☛ Search index

- determine what data sources are available based on keyword searches
- review data source information to determine usefulness
- learn the steps involved in requesting data sources

☛ Read/post information

- request data sources from data providers
- learn how others have used data available in the region
- post suggestions for system enhancements and modifications
- post results of research and list upcoming studies

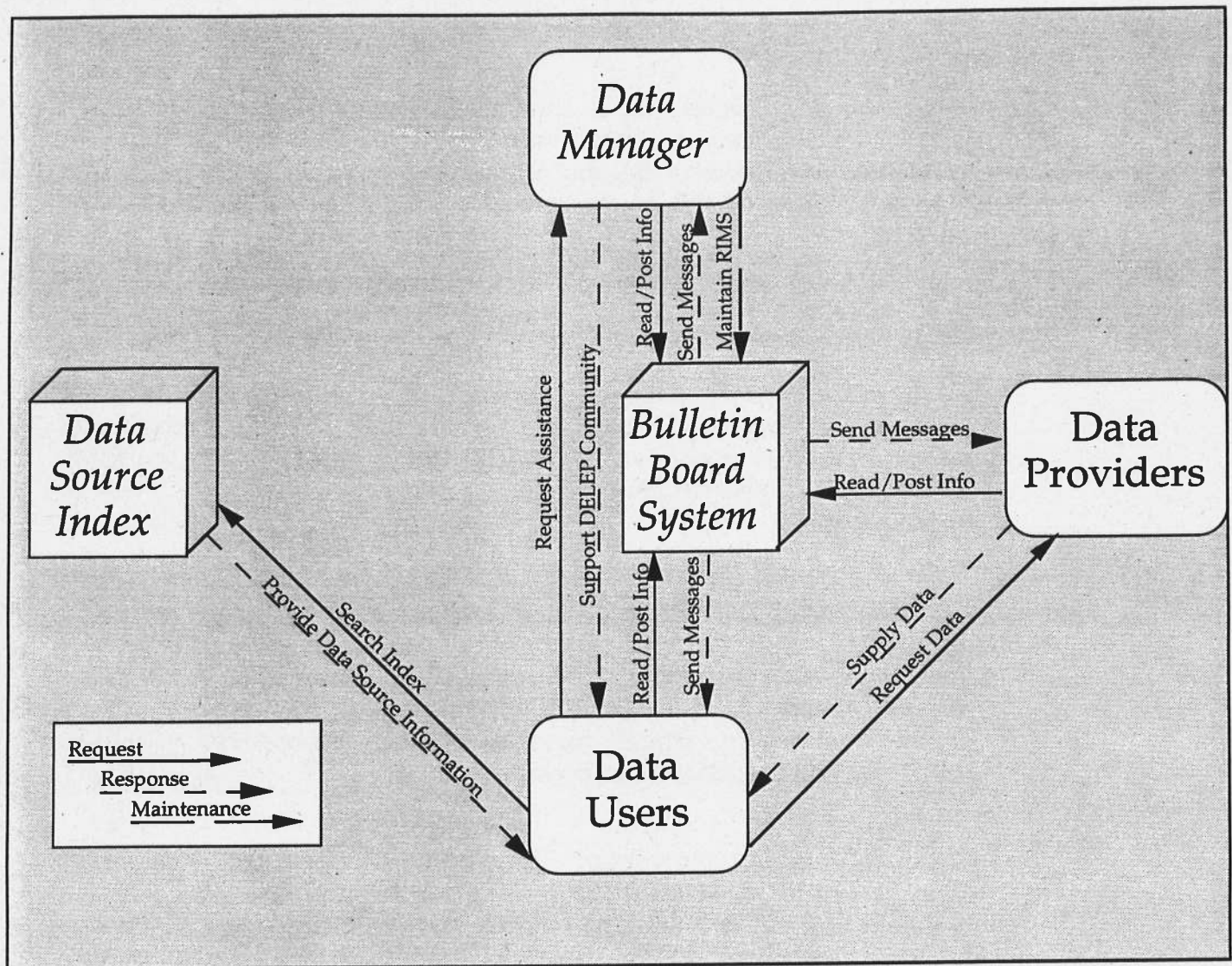


Figure 5: RIMS from a Data User's Perspective

Functional Assessment

The analysis of user needs and a conceptual model of RIMS led to an assessment of the functions associated with the operation and maintenance of RIMS. This functional assessment was an important step in the RIMS design process because it provided an opportunity to perform a review of the proposed RIMS model.

This functional assessment is supported by the three project tasks:

- Data Provider Survey. Because RIMS must provide a sufficiently extensive data source index to attract users, the data provider survey asked recipients to comment on the RIMS concept and indicate whether they would participate in the service. Thus, the purpose of the data provider survey was to estimate the level of demand for RIMS and determine how to configure the service to attract high levels of participation.
- Research and Data Collection Project. This research and data collection project was staged to test the feasibility of obtaining data from designated data providers. The test sought to measure the effort required to obtain data about the Delaware estuary. This project provides a "reality check" for someone who might try to obtain information from RIMS data providers.
- Data Management Workshop. The workshop introduced DELEP data users to the ODES/STORET Bridge. Since a large portion of DELEP data is stored in these two national databases, this workshop explained how to access historical DELEP data stored in these databases. Without access to these databases, data access within the region would still be a problem.

The remainder of this section discusses the findings from the functional assessment. These findings were made based on input of each of the project areas and AMS's experience with data management. The majority of these details relate directly to the research and data collection project. Detailed results from each of these project areas are provided in Appendix A.

In general, the data providers were very cooperative, interested in the "study", and anxious to help. The following comments can be made to further characterize the responses from the data providers:

- Data providers encouraged a review of hardcopy before requests for automated files were made. In the interest of efficiency, data providers encouraged the researchers to review the appropriate hardcopy summary reports before requesting hardcopy data files. Data providers were concerned about spending their own time and external resources on ill-focused requests. RIMS could assist users by summarizing these reports and allowing users to directly request the appropriate data rather than delaying the request (*i.e.*, waiting for the report to be mailed, reviewing the appropriate documentation, contacting the provider a second time).
- Quick turn-around on hardcopy requests. Hardcopies of data reports were generally received in 3-4 days after the request was made. In most cases, very little follow-up was required to obtain hardcopy reports. However, even after receiving these documents, the user is not guaranteed to have the necessary information to request a data source. Being able to view summaries of these reports through RIMS would provide a more time efficient means for locating data sources.
- Written requests were required. Many data providers asked for the request for data to be provided in written form. In all cases, faxes were sufficient. Data Providers may also accept messages through the BBS if those requests can be printed.
- Hardcopies were free. None of the data providers included in the "study" charged for hardcopies of reports. This fact will not pose a problem for RIMS users.
- Automated files can get expensive. Although some of the data providers were willing to provide automated files at no charge, many of the more complicated (and therefore time consuming) searches and retrievals would cost money. Estimates for the appropriate nitrogen loading data in the study area were as high as one hundred dollars. RIMS may be able to store the frequently requested files in the data depot and reduce the expense to both data providers and data users.
- Data were available in a variety of formats. Most data providers were willing to provide copies of their data in a range of formats including spreadsheet files, tables, and ASCII files. If providers can create the appropriate format for users, this fact will not pose a problem for users. If providers cannot assist in the format conversion and users do not have the appropriate software for converting the data, RIMS may be able to assist users with such data translations.

Even though this research and data collection study revealed a data provider community that was very helpful, AMS did encounter the following problems:

- It is difficult to know which organization collects data. Researchers spent a fair bit of time trying to pinpoint the organizations with the right data. It was especially difficult for the researchers to navigate through the state offices of federal agencies (e.g., USGS, EPA). Agencies seem to have overlapping and sometimes ambiguous responsibilities for monitoring and data collection and analysis.
- Researchers had some difficulty tracking down correct contacts. Trouble with targeting the right organization was compounded with difficulty finding the right person in the right organization. Some agencies had data administrators clearly defined, others did not. Some agencies have public information officers (e.g., USGS) who respond to any and all requests from the public for information (including monitoring data).
- Up-to-date phone and fax numbers would enhance response time. Researchers spent a fair bit of time updating the contact information for data providers. RIMS will need a mechanism to ensure up-to-date information is available.

This functional assessment or feasibility test has implications for the design, operations, and maintenance of RIMS. In general, RIMS needs to capture and maintain a range of information about the variety of organizations that collect data on the Delaware estuary needs. Specifically, the following information should be tracked:

- organization name
- type of data collected (including study area, parameters measured)
- sampling methodologies/protocols
- sampling history
- name, address, phone and fax numbers of contact person(s)
- format of data

RIMS should provide a useful tool that will correct many difficulties users currently encounter. For example, users will know who to contact for data sources and additional information rather than being transferred from one individual to another. Users can also directly request data sources rather than waiting for hardcopy reports that store the same type of information that RIMS provides.

Feasibility Review

The following analysis further reviews the RIMS model by weighing the benefits of the service against the resources required for its development. This section is divided into three parts: technical evaluation, staffing requirements, financial considerations, and operational issues. The technical evaluation highlights how RIMS can fill a current void for the DELEP community by outlining ways in which the technical components of RIMS address current data access problems. The analysis of staffing requirements estimates the number individuals and level of experience necessary to perform both long-term and short-term tasks. Financial considerations outlines possible insights into financing RIMS. The final section defines some operational issues that should be considered at this time.

Technical Evaluation

The user needs analysis presented in Appendix A identified several data access problems that are encountered by the DELEP community. This section contains a technical evaluation of the RIMS design based on its ability to resolve each of these difficulties.

- Lack of knowledge about available data sources. The RIMS data source index will address this problem by providing a consolidated register of data sources (electronic and non-electronic) for the region. This feature will significantly increase a user's ability to identify and locate available data by providing "one-stop shopping" for information about data sources.
- Confusion about how to obtain data. The RIMS data source index will provide users with all information necessary to obtain a data source. For example, the index entry for each data source will supply the name, address and phone number of a person to contact to obtain the data. The information in the index will also include an explanation of the procedures for obtaining data (e.g., send a written request, call the contact listed). In addition, RIMS will describe access restrictions and fees that may apply to specific data sources.
- Lack of information about QA/QC procedures. The information stored in the RIMS textual abstract will be provided at the discretion of the provider. Guidelines for abstract development, however, will strongly recommend that information about QA/QC procedures be included. Data providers will also be encouraged to include information about duplicate laboratory measurements, recording of detection limits, data entry validation procedures, and other QA/QC techniques. Required QA/QC information that is not provided through the index should be available from the data source contact.

- Incompatible data formats and standards. Data providers will be encouraged to include information in the textual abstract describing formats and standards associated with the data source (e.g., the names and placement of the fields, the units associated with a measurement). This information will assist users in interpreting and analyzing individual data sources; however, it will not eliminate the need to standardize data from different sources before conducting a combined analysis. DELEP mandates that all new data sources collected with National Estuary Program funds be submitted in ODES format. However, compatibility problems still exist for historical information and data sources not collected using NEP resources. This problem cannot be fully addressed until a standard model for all data has been adopted and enforced. It is possible that as the implementation of RIMS increases the use of Delaware Estuary data, the need for a standard data model will become more widely recognized.
- Insufficient information about data source documentation. Information (e.g., associated reports, descriptions of study design and methodology) about data source documentation will be among the recommended items for the data source textual abstract. Data providers will be asked to specify the names of reports and publications related to each data source as well as information about sampling design and methodology. Also, since the RIMS data source index will contain information about electronic and non-electronic data sources, individual index entries for reports, gray literature, and other documentation will be included.
- Slow responses to requests for data. RIMS will decrease the response times for the most frequently requested data sources by storing these sources in the data depot for quick distribution by the data manager. Additionally, response times will be improved through the formation of a RIMS data provider consortium. This consortium will work to facilitate data exchange by developing standard data release agreements for use by all participating agencies. (Additional details about the RIMS data provider consortium are presented in the following section.) Based on this discussion, it is apparent that the proposed RIMS design will facilitate data access and exchange by removing many of the data obstacles currently confronting the community. To fully assess the feasibility of the model, these benefits must be weighed against the resources required for RIMS implementation.

Staffing Requirements

The staffing requirements for RIMS can be divided into two roles: development and maintenance. These roles are very different. Development includes designing the user-interface, developing the data source index data structure, and outlining methodologies for system maintenance. System maintenance refers to the day-to-day functioning of RIMS. The system development role is very specific and should occur during the first six to nine months. System maintenance will occur concurrently with system development and continue throughout the life cycle of the service. Since RIMS should be publicized and the data manager needs to locate information for the index, it is conceivable that the data manager will not have the time or expertise to develop the user interface and system components of RIMS. These tasks could be assumed by a system development team. Once RIMS is developed, the development role will cease to exist unless DELEP decides to implement enhancements.

This section discusses the roles and responsibilities that DELEP should consider in the long-term excluding the development role. This discussion includes the role of a data manager, system administrator, and the RIMS data provider consortium.

The Data Manager

Under the proposed model, the data manager plays a pivotal role and is crucial to the functional success of RIMS. As outlined on page eight, the data manager's responsibilities will be numerous and diverse in nature. Because the role of the data manager is so central to the RIMS concept, careful consideration must be given to staffing the position. The data manager should be someone with expertise in data exchange, integration, and GIS. Most importantly, the data manager should have an extensive knowledge of regional data sources.

The first six months of RIMS implementation will be focused on building the data source index and bulletin board system. This will include the design, coding and testing of a user-interface for the index and bulletin board. These tasks should not be performed by the data manager, but rather by an additional staff member or private contractor with expertise on similar projects. During this stage, the data manager will spend substantial time contacting data providers to request information about data sources and entering the information into the index. As data sources are identified and acquired, the data manager will also begin to establish the data depot. Finally, the data manager will be conducting activities to publicize the service to the DELEP community. After the first six months, the data manager will oversee the operation, maintenance, and planning of RIMS. The data manager will coordinate all DELEP data management activities and manage all communication with data providers, users, and other members of the

DELEP data management community. This includes working with members of the data provider consortium, Data Management Committee, and Scientific and Technical Committee.

Regardless of his or her qualifications, the demands on the data manager will increase dramatically as RIMS becomes known throughout the community and usage rises. As this occurs, the data manager will need to delegate duties to the data management assistant and technical operator. As the data management staff expands however, it will be imperative that the data manager remain the central coordinator for all data management activities. According to the *Tier I Estuary Program Data Management Systems Summary*, the experiences of other estuary programs support this recommendation. In interviews with several Tier I National Estuary Programs, representatives stressed the importance of having one staff member to coordinate all data management activities.

System Administrator

Initially, RIMS usage is expected to be fairly light. During this time, the data manager alone will accomplish all RIMS responsibilities. However, as RIMS usage expands, the demands on the data manager will undoubtedly increase and additional staff may be required. The workload of the data manager should be periodically evaluated and additional support should be provided as deemed necessary. After six months of RIMS operation, the data manager will probably require the assistance of an additional part-time employee. It is likely that within one year, the data manager will require one full-time assistant. These estimates are based on a preliminary investigation of other estuary programs. While the data management staffs of the estuary programs range from one part-time employee to as many as 30 employees, most programs employ a staff of between one and two employees. The San Francisco Estuary Program developed a service similar to RIMS which is operated and maintained by two employees.

This staff person will be responsible for the technical issues associated with DELEP data management, including the maintenance of the data source index and data depot. The technical operators specific responsibilities would include the development of a CD-rom which includes a RIMS Users Manual. This CD-rom would provide the DELEP data community with automated information about the operation of RIMS, and may eventually include automated versions of the data source index and data depot. By providing this automated service, the CD-rom can reduce some of the demands on the RIMS data management staff.

RIMS Data Provider Consortium

The RIMS data provider consortium is an informal group of data providers who will meet on a regular basis to discuss the data exchange and management issues associated with RIMS. Every six months, the data provider consortium will conduct a formal review of RIMS and make recommendations for improvements to the Estuary Council. The consortium is an advisory body to the data manager and DELEP on data management and associated technical issues. As advisors, members of this consortium will be available, on an ad hoc basis, for consultations with the data manager. They will advise the data manager on the operation, maintenance, and planning of RIMS. They will also be expected to grant legal access for use of their data.

Financial Considerations

When reviewing the data management plans of other estuary programs, AMS found that data management strategies varied in sophistication from centralized data management systems to distributed data storage approaches. Data management strategies seem to be highly correlated to the resources allocated to data management activities. On average, the Tier I National Estuary Programs report that data management activities account for ten to twenty percent of their annual budgets. The most expensive and comprehensive systems involve central, standardized storage of all estuary data. While this type of system has many benefits, it is extremely costly and therefore may not be financially feasible for DELEP. Alternatively, many estuary programs have chosen to manage data in a distributed fashion. This approach leaves storage responsibility with the data collector and thereby eliminates the costs associated with centralized data management. Most of these programs have chosen to pursue the lower-cost solution provided by a data source index similar to the one proposed in the RIMS model. Several programs have developed data indices including San Francisco Estuary Program, Galveston Bay National Estuary Program, Santa Monica Bay Restoration Project, and Barataria-Terrebonne Estuary Program. The popularity of the data source index approach among NEPs suggests that it provides a cost-effective method for facilitating data access and exchange.

When considering the economic feasibility of the RIMS, there are three additional issues which should be considered; sharing the development costs with other estuary program, obtaining resources to replace EPA funding when it expires, and investigating possible industry sponsorship for relevant RIMS activities.

- Sharing RIMS development costs with other estuary programs. DELEP should address the possibility of sharing RIMS development costs through the formation of partnerships with other estuary programs. Several other programs in the north-eastern U.S. are currently in the process of developing data management strategies. The Gulf of Maine Regional Marine Research Board recently conducted a workshop on the development of an information system for the Gulf of Maine Region. Similar efforts are also about to begin as part of the New York-New Jersey Harbor Estuary Program and the Long Island Sound Study. DELEP should consider the possibility of involving other programs in the development of RIMS. Since the RIMS concept is generally applicable to other programs as well as DELEP, another estuary program might be willing to financially contribute to the development of the user-interface, data source index, and bulletin board system. Coordinating the efforts of RIMS development with these other programs would reduce duplication of effort and decrease the ultimate cost to DELEP. The DELEP data management plan could further investigate the potential for establishing such partnerships.
- Obtaining resources to replace EPA funding. An additional consideration surrounds continued funding of RIMS after EPA ceases to financially support the estuary program. At the NEP Data Management Workshop, representatives of several Tier I National Estuary Programs indicated that they were struggling with this issue. Early in the RIMS development process, it will be important to secure involvement and commitment from the appropriate organizations to ensure that RIMS receives continued support in the future. DELEP should work to develop agreements with organizations that have a long-term interest in the data of the estuary region (e.g., state and local governments, universities). DELEP's data management plan should address the issue of future funding for RIMS and make recommendations about potentially supportive organizations.
- Obtaining industry sponsorship. There are a variety of industries operating in and around the Delaware estuary that have a vested interest in the collection, analysis, and maintenance of environmental monitoring, land use, and other data. DELEP should investigate the possibility of obtaining sponsorship from those corporations by targeting the geographic areas where industry is most prevalent. With the proper corporate sponsorship, RIMS may be able to assume some data management responsibilities previously handled by industry groups.

DELEP may want to consider establishing a toll-free (800) number for RIMS to encourage community across all States involved in DELEP data management activities. In addition, DELEP must also factor in the costs of long distance return phone calls to data users and data providers.

Operational Issues

There are several issues associated with the operation of RIMS that must be considered as part of the functional assessment. These issues include documenting data sources, automated access to data descriptions, granting user access to the bulletin board, timely response to bulletin board-based inquiries, and encourage participation in RIMS by the DELEP data community.

- Document data collection organizations and contacts. Given the large number of organizations involved in the collection of environmental data in and around the Delaware estuary, it is essential to document those activities and profile the persons involved in the data collection and distribution activities. This documentation should limit, as much as possible, the degree to which those in search of data are given the "run-around."
- Facilitate the submissions of data descriptions. In order to obtain as many descriptions of data as possible, RIMS should make it as easy as possible for data providers to submit descriptions of their data. This may entail allowing data descriptions to be submitted on disk or through the electronic bulletin board. The data manager can ensure the integrity of these individual descriptions as well as the data source index by either handling subsequent edits or working closely with data providers to update the descriptions. The integrity of the index and descriptions can also be protected by granting data users with read-only access.
- Protect access to electronic bulletin board. In addition, RIMS users will need to obtain a password and ID number in order to access the electronic bulletin board. RIMS may want to consider issuing generic IDs to a wide group of users for public access areas to libraries (?).
- Respond quickly to bulletin board messages. The data manager or someone else from the data management staff should strive to respond to all bulletin board messages within 24 hours of their receipt. The reply may only provide the estimated time for completing the requested task (e.g., search the data index, send a hardcopy document, etc.).
- Manage expectations of data source index users. If the data provider limits requests for data to the bulletin board requests, the index should state how often and quickly users should expect data from the provider. In addition, the data requester should have some recourse if his/her request is not processed in a timely manner.

- Encourage participation in RIMS. DELEP needs to find ways to encourage voluntary involvement in RIMS. Outreach activities, including a regular newsletter, fact sheets, and a CD-rom of the RIMS users manual, data source index, and data sources, can help to increase awareness and use of RIMS.
- Consider a central location for the Service. RIMS should be housed in a location that promotes equal access by all potential users. A central physical location will help to ensure balanced use across the DELEP data community.
- Designate specific data providers. Designating a contact person who will act as the data provider will limit the time required to obtain data. The RIMS data management team must designate specific individuals (and not organizations) who will actually submit data to RIMS.
- Keep contact information current. In order to ensure the smooth retrieval of data and other information, DELEP must consider ways to efficiently update names and phone numbers of data providers. The RIMS data management staff may want to consider an annual survey of all data providers aimed at keeping contact information up-to-date. Conversations throughout the year are also good opportunities to update contact information.
- Subsidize the writing of data descriptions. DELEP may want to consider subsidizing the writing of the data descriptions. This could be done in several ways. DELEP could have a member of the RIMS data management team draft a description of the data source; the data provider would only have to review and edit the draft. DELEP might be able to provide some free publicity for the data provider through a variety of RIMS outreach activities in exchange for a well-written data description.
- Capture only essential data. DELEP must decide which data it will actually house in its data depot. Among the criteria that DELEP should consider before adding a data source to the depot are its applicability across DELEP and the integrity of the data source (including the sampling protocols followed, the parameters sampled, the age of the data, and its relationship to DELEP's priority problems). In the same regard, DELEP should strive to eliminate duplicate data sources in RIMS as much as possible.

In summary, the RIMS model satisfies the needs of the community by successfully addressing nearly all of the data access problems that are currently encountered. Moreover, the staffing and financial requirements are reasonable, especially considering that opportunities may exist for coordinating with other programs and/or obtaining industry sponsorship, thus decreasing costs still further.

The operational and data management issues related to RIMS are manageable if properly addressed. DELEP must establish a set of data management policies which will guide the operation and maintenance of

RIMS. Many of those policies and other sound practices are included in the Data Management Plan.

Conclusion

AMS has developed a conceptual model of the Regional Information Management Service using input from a series of workshops, the data user and data provider surveys, a research and data collection project, and discussions with other National Estuary Programs about how they manage environmental data. The proposed model has been subjected to several iterations and modifications based on these activities, and if implemented, the service will improve access to environmental and land use data by providing:

- An electronic data source index. This index will contain information about regional data sources.
- An electronic bulletin board system. This bulletin board will provide a forum for data-related communication,
- A data depot. This data depot will store frequently accessed data sources.
- A RIMS data manager. The RIMS data manager will assist users in locating and accessing data sources.

The functional assessment demonstrated that the proposed service would address the majority of data access problems without requiring unreasonable staffing or financial resources. Overall, the current RIMS design seems to represent a feasible strategy.

C. Implementation Details

This appendix supplements the conceptual design and implementation strategy through the following sections:

- Detailed Costs for UNIX Implementation. Itemizes the components that must be available for RIMS implementation. DELEP will either need to purchase these items or select an existing organizations that can supply them. Please note that the total for baseline software does not include the customized software. Cost estimates for that component are provided in chapter 5.
- PC Alternative. Explains the disadvantages of implementing RIMS on a PC. If DELEP decides to implement a PC version in spite of these disadvantages, this section summarizes how the implementation strategy, outlined in chapter 5, changes.
- Comparison of Alternatives. Compares the PC alternative with the recommended UNIX solution and the enhanced UNIX alternative outlined in chapter 5.
- Potential Implementation Partners. Provides the results from a questionnaire used to seek out organizations that were interested in assisting with RIMS implementation.
- Considerations for Implementation. Highlights issues that DELEP should consider before proceeding with this project.

Detailed Costs for UNIX Implementation

Hardware/Software Cost Estimate

The following table summarizes the cost estimates for hardware and software. A break-down of these costs are provided on the following two pages. Please note this estimate does not include RIMS system development, integration, installation, and long-term maintenance.

Item Description	Total \$	Maint. \$
Baseline Hardware Total	\$46,845	\$4,521
Baseline Software Total	\$2,990	\$400
Baseline Total	\$49,835	4,921
Optional Software	\$9,798	1,200
Optional Total	\$59,633	\$6,121

Baseline Software Cost Estimate

Item Description	Total \$	Maint. \$
Z/Max XChange (BBS)	1,495	400
Microsoft Office, Professional Edition	650	0
Procomm Plus (communications)	150	0
Norton Desktop	150	0
System diagnostics		
Anti-virus		
eXceed/W (X-emulation)	545	0
Baseline Software Total	\$2,990	\$400

Optional Software Cost Estimate

Item Description	Total \$	Maint. \$
Arc/Info, single user license	8,000	1,200
ArcView	1,000	0
AIX XL FORTRAN compiler	798	0
Optional Software	\$9,798	1,200
Baseline Software Total	\$2,990	\$400
Server Sub-Total	\$12,788	\$1,600

Baseline Hardware Estimate**Data Manager's PC**

Item Description	Total \$	Maint. \$
IBM Valuepoint PC	3,109	450
8 MB memory		
128K external cache		
340 MB IDE hard disk with 128K cache		
Integrated disk controller		
1.44 MB diskette drive		
Video controller with 1 MB DRAM		
15" color monitor, 72 MHz		
DOS 6.0		
Microsoft Windows 3.1		
5.25" diskette drive	99	15
PC Sub-Total	\$3,208	\$465

UNIX Server

Item Description	Total \$	Maint. \$
IBM RS6000 POWERserver 370:	18,900	1,908
62 MHz processor		
32 MB memory		
Four Micro Channel slots		
Built-in SCSI and Ethernet controllers		
Keyboard and mouse		
One parallel port		
Two serial port		
1.44 MB diskette drive		
1 GB SCSI hard disk	800	180
2D graphics adapter	1,895	228
8 serial port adapter card	832	0
Multi-serial port cable	384	0
6 Hayes 14.4 kbps modems	2,640	0
17" color monitor, 77 MHz, 1280x1024	1795	192
Terminal cable	130	0
Token Ring 16/4 card	1,030	0
US 101 key keyboard	265	0
3 button mouse	135	0
Printer cable	29	0
4039-10R IBM laser printer	1,599	240
2.3 GB 8 mm tape drive	5,415	840
CD-ROM drive	950	276
1.2 GB 1/4" tape drive	2,295	192
Fortress UPS	694	0
AIX v3 on 8 mm (operating system)	425	0
RS6000 8-user licenses	2,800	0
On-line user manuals/help text	124	0
AIX Windows	500	0
Server Sub-Total	\$43,637	\$4,056
PC Sub-Total	\$3,208	\$465
Baseline Hardware Total	\$46,845	\$4,521

PC Alternative

In Chapter 5, AMS describes two alternatives for implementing RIMS. This appendix provides a third alternative. This alternative strategy simply implements the conceptual model presented in Chapter 3 on a PC and eliminates the electronic data depot option. This alternative has three major drawbacks:

- ☐ *Higher* annual maintenance costs
- ☐ No access to national databases which house a large quantity of historic data from the estuary region
- ☐ No capability for future upgrades

Below are some examples of upgrade capabilities that DELEP could *not* implement with this system.

- ☐ Development of a fully functional electronic Data Depot
- ☐ Development of coverages that show where data were collected
- ☐ Translation of files from ARC/Info to ASCII text

This alternative does not allow DELEP the capability to automate the data depot which many data providers stated they would use because this component needs a multi-tasking environment and built-in file searching capabilities. If providers submit information to the data depot and the data manager cannot easily distribute that information electronically, DELEP's annual maintenance cost will increase. This increase will be due to such items as mailing data and purchasing additional supplies. In addition, you are adding clerical type tasks to the roles and responsibilities of the data manager.

Even though both the PC and UNIX alternatives offer user-friendly interfaces, users will notice a difference between the two systems because of the dramatic change in functionality. In the PC alternative, users will be denied direct access to data in both EPA systems and the RIMS data depot. The recommended UNIX solution included this functionality because of user requests. Without this functionality, RIMS will have less value in the eyes of potential users.

If DELEP does decide to implement this alternative, a schedule for implementation is provided below. Note the cost of task 1.0 decreases because of lower hardware costs (PC v. UNIX). In this estimate, task 4 includes the development of a document and file management system for the data depot rather than the electronic version proposed in the recommended solution. Task 5.0 increases because the data manager would need additional administrative utilities to ensure the availability of data in the depot (e.g., inventory reports). In summary, the overall price decreases by approximately 20%, but DELEP foregoes the capabilities mentioned above and incurs higher annual operating costs.

Task	Month #1				Month #2				Month #3				Month #4				Month #5				Month #6				Total Cost
1.0																									42,000
2.0																									18,000
3.0																									55,000
4.0																									15,000
5.0																									20,000
6.0																									25,000
Total																									175,000

The above alternative could also be implemented on the RS6000 workstation. The difference in price would be \$20,000. If DELEP were to use the RS6000 workstation rather than the PC, DELEP would be able to expand or upgrade RIMS at a later date. If DELEP initially implements a BBS on the PC and then moves to the UNIX platform, DELEP would either 1) have to pay to develop the BBS on both platforms or 2) maintain both a PC and UNIX platform. Therefore, AMS suggests that DELEP select a platform before implementing any component of RIMS to avoid duplication of effort and expense.

Comparison of Alternatives

The following describes the differences between the PC alternative and the two UNIX alternatives described in the Implementation Strategy. The following table lists each alternative and provides the system development cost for each. To implement any alternative, the steps involved are similar. The difference in costs comes from changing the level of effort required for specific tasks. Alternative I is described in the previous section. Alternative II and III are discussed in Chapter 4, Implementation Strategy.

<i>Alternative</i>	<i>Description</i>	<i>Development Cost</i>
1	Minimal Configuration (described above)	\$175,000 or \$195,000
2	Recommended Strategy (described in chapter 5)	\$220,000
3	Enhancements to Alternative 2 (described in chapter 5)	\$280,000

Alternative I will cost either \$175,000 or \$195,000 depending on the selected platform. In this alternative, DELEP can only add future enhancements to RIMS by employing the UNIX workstation which costs \$195,000. The cost differential to then implement the recommended strategy would only be \$25,000 or 10 percent more if the alternative is implemented at the original time of development. If DELEP decides to initially build Alternative I with the intentions to expand to Alternative II, the cost differential could be greater than \$25,000. For example, if the data manager organizes the depot using a logical process that could eventually be automated, the cost of developing Alternative II will be less than if the data manager has a less structured organization of the depot. The actual difference in cost will be the amount of design needed to implement Alternative II.

In the recommended strategy, Alternative II, RIMS will better utilize the available technology. This modest investment will substantially reduce long-term RIMS maintenance. This decrease in long-term expense in addition to the technical advantages are sound reasons for implementing Alternative II over Alternative I.

Alternative III, the recommended solution plus enhanced capabilities (*i.e.*, data window), will cost an additional \$60,000 or 27% more than Alternative II. The cost differential between these two alternatives will be approximately the same whether the added features are implemented initially or at a later date.

Potential Implementation Partners

In addition to these three alternatives, AMS developed a questionnaire to seek out organizations interested in supporting RIMS implementation. Participation was considered for three major components: hardware, software, and personnel. This section includes the results of that questionnaire.

The following table lists the organizations and key contact that organization that received the survey. The *survey* column denotes whether or not the organization completed and returned the survey to AMS by May 15, 1994. The other three columns show the components that are either available or could become available for specific organizations. For example, DRBC responded to the survey and can contribute part, but not all, of the hardware and personnel requirements needed for RIMS implementation.

Organization/Person	Survey	S/W	H/W	Personnel
DRBC/Warren Huff & Dave Pollison	YES	○	◐	◐
Maritime Exchange/Lisa Himer	YES	○	◐	◐
EPA Region II/Harvey Simmon	YES	○	●	○
Bucks County Planning/Vitor Vicente	YES	○	◐	◐
NJ DEPE/Larry Thornton	YES	○	◐	○
USFWS/Greg Breese	YES	○	○	○
NOAA-COMPAS/Betsy Archer	YES	○	○	◐
MAFMC/Tom Hoff	NO			
DVRPC/Bill Green	NO			
DE DNREC/Rick Truitt	NO			
DE Dept of Public Instruction/ Steve Barbado	NO			
USGS/Eric Evenson	NO			
TNC/Ann Heasley	NO			
PADER/Rick Shertzer & Rod Kime	NO			
Army Corps/Ted Keon	NO			
PENJERDEL/Liz Ferry	NO			
Water Resources Agency/David Racca	NO			
PADER/Jim Walsh	NO			
DE DNREC/Mike Mahaffie	NO			
National Park Service/Dave Lange	NO			
PADER Info Services/Tom Baldwin	NO			
EPA Region III/Marria O'Malley Walsh	NO			

Key: ● = currently available, ◐ = partially provided, ○ = need outside resources

Based on responses and phone conversations, the following organizations are willing to assist with implementation. Below is a summary of the responses along with issues to consider before selecting an implementation partner.

Delaware River Basin Commission (DRBC)

As an organization that serves the entire DELEP region, DRBC has several advantages to becoming a centerpiece for RIMS implementation and maintenance. If selected, DRBC proposes a two phase implementation. During phase 1, a BBS with a menu listing data availability would be developed on a PC platform. With assistance from a consultant, DRBC would also begin developing the Data Source Index and compiling data for the depot. During phase 2, RIMS would become fully operational on a UNIX platform.

This alternative is equivalent to partial implementation of Alternative 1 and full implementation of Alternative 2. Since phase 1 is developed on a PC and phase 2 uses a UNIX workstation, the level of effort expended on phase 1 system development will have to be performed twice (*i.e.*, once for each platform). In addition, even though the BBS interface will still be user-friendly, the actual appearance will change. Therefore, DELEP will incur costs for BBS development twice, and users will need to become familiar with a different interface after phase 2 implementation. Depending on how the menu for listing data availability is implemented, the menu may or may not be able to be used during phase 2.

DRBC proposes a cost of \$60,000 for one half staff year. Additional costs would be incurred for purchasing and installing the BBS, developing the Data Source Index, and compiling information for the Data Depot. Please note that while BBS software can be purchased for \$150, this cost does not include installation, modifications, or enhancements.

Ports of Philadelphia Maritime Exchange (PPME)

PPME has a PC LAN server that uses Novell 386 Netware. In addition, there is one workstation that currently handles 8 external users with the potential to handle 16 in the future. At present, 40 area businesses dial into the server through standard phone lines. PPME does not plan to incorporate toll-free access, but there is a potential to link with Internet. Users are limited to IBM compatibles PCs and Hayes compatible modems. PPME would provide the necessary communication software.

Using PPME equipment, DELEP would be limited to Alternative 1. PPME could provide minimal user assistance but would not be able to commit to the role of data manager. PPME also does not have the resources to develop the RIMS software. If DELEP would prefer to implement Alternative 2 or 3, additional hardware would also need to be purchased.

One major concern with using the existing dial-up interface is that users must have IBM compatible PCs and Hayes compatible modem. With the recommended UNIX solution, users could access RIMS with any type of computer (e.g., PC or Macintosh), modem, and communication software combination. During the first JAD session, one of the identified critical success factors was to provide users with access to RIMS from any platform. PPME does not currently offer that capability. If needed, PPME may be able to provide access to Macintosh users as well, but this feature is not currently available.

New Jersey Department of Environmental Protection & Energy (NJDEPE)

NJDEPE responded to the questionnaire and provided a summary of their existing equipment. However, the response is best summarized in the cover letter: "At this time we think it would be inappropriate for a state organization to be a site for the RIMS. Rather we see our role as a data provider." As discussed in further detail in the next section, AMS suggests, like NJDEPE, that RIMS would be of greater value if not implemented at the state level.

U.S. EPA Region II

EPA Region II currently has both a UNIX workstation and PC LAN. They have already implemented a back-up system and have CD-ROM, 9 track, and 8 mm tape drives. Software development and data management tools include dBase, Oracle, and Clipper. While the region could potentially assist the implementation by providing these resources, the data manager would be responsible for system maintenance. Since the data manager will be busy coordinating data providers and users, DELEP would need to hire both a data manager and a system administrator.

Bucks County Planning Commission

This group has both UNIX and Apple/Macintosh workstations, a GIS administrator, and several data managers as well as extensive experience with management and development of databases. In addition, they have several concerns and various issues that would need to be addressed. In summary, "the ultimate decision to participate in this program will depend on operating costs to be incurred; the benefits to be derived; funding availability to acquire additional needed equipment (short-term) and upgrades to the system (long-term); cost of alternative sources of information; and methods to disseminate own information."

NOAA - COMPAS

Since COMPAS is a database rather than indexing system, there does not appear to be a match between the two systems. Betsy Archer, the primary contact, did mention that a co-worker (Russ Perry) could be available to attend a RIMS implementation meeting and provide insight into Local Area Networks.

Considerations for Implementation

RIMS offers DELEP a valuable tool not only for data management but for regional coordination and communication. The BBS provides users with a tool to inform others about the status of the estuary and various activities that are planned for the region. In addition, making data available to the region, through a service such as RIMS, can make data collection efforts more valuable. However, before implementing RIMS at an existing organization, DELEP should consider the following.

- ☐ Implementing RIMS within an existing organization will tend to increase development time and pose potential conflicts with ongoing work. For example, if you use existing hardware, system development will need to take place on-site which means either 1) the existing system will be unavailable during the six month development stage or 2) implementation will exceed the six month estimate. An alternative is to lease compatible equipment for off-site system development. In this scenario, the amount of time that both developers and existing staff will both need to access the existing hardware is decreased but not eliminated.
- ☐ If any of these organizations are selected, hardware costs would be less expensive but not eliminated because DELEP would need to enhance the existing system to support the additional functionality (i.e., disk space, modems). In addition, the cost of system integration and testing would increase possibly eliminating the cost savings. Integrators would need to work within the bounds of existing software and communication packages and ensure there are no system conflicts both internally to RIMS and externally to the larger existing system.
- ☐ Based on the conceptual model, the data manager is a full-time position. Regardless, of where RIMS is installed, this individual would need to be hired. The system administrator is also a critical role, but may be able to be supplemented by the existing system personnel. These personnel expenses (salary and benefits) constitute over 70% of the annual maintenance budget or \$84,500. To make RIMS a success, DELEP would still need to incur or supplement this cost.
- ☐ Another expense that DELEP would probably not be able to impose on an organization is phone service. RIMS needs a separate phone line for users to access the service. This cost (\$24,000/year) may be reduced but not eliminated.
- ☐ DELEP should also consider the impact that RIMS may have on an ongoing agency's operations. For example, if conflicts arise over supporting existing operations or RIMS, an organization will probably tend to let RIMS suffer.

- A key component for RIMS implementation that is not currently available at an existing organization is RIMS software. The quality of this component will determine the long-term success of RIMS. For example, if the interface is user-friendly, RIMS is likely to attract a larger audience and thus become a more valuable tool for the community. Moreover, if software developers consider possible enhancements during the initial design phase (i.e., adding users with different access privileges, providing additional security before connecting with Internet, and attaching to other databases), DELEP will incur smaller costs associated with long-term system maintenance and enhancements. Based on AMS's experience with system development, these issues seem straight-forward but successful implementation takes experience. Therefore, DELEP should consider finding an organization that has an extensive background in system development.

D. Responses to Implementation Questionnaire

Subject: Delaware Estuary Regional Information Management Service
From: Bruce Hargreaves, Chair
DELEP Data Management Committee
To: Potential RIMS Development Partners
Date: April 25, 1994

Delaware Estuary Program (DELEP) is looking for partners to assist with the implementation of a regional information management service (RIMS). RIMS will facilitate environmental data access to users throughout the region. The current RIMS design includes an electronic data source index and a bulletin board system with telephone and internet access. Users can search the electronic index to locate specific data sources. The entire community can use the bulletin board system to post requests for data, inform others about upcoming events, and discuss various issues concerning the region. In addition, a data manager will be available to address any technical questions that cannot be resolved electronically and facilitate access to data.

In the draft Data Management Plan, our contractor outlined the software, hardware, and personnel requirements for implementing this service. DELEP would like to know how your organization could act as a partner in the implementation. For example, which of the necessary hardware, software, and personnel components would you be willing to work with DELEP to provide? You can provide this information by completing the tables on the following two pages. See page 2 for instructions on completing the tables.

In addition, please provide any details that may assist DELEP in reaching a decision as to an optimal configuration of RIMS. For example, you might include a timeline for system development, assumptions about the involvement of other organizations, current connections to internet, and the estimated cost to DELEP and/or RIMS users. Also note any deviations from the current implementation strategy such as a change in hardware or software. Please provide as much detail in this description as possible. Sample descriptions are provided after the tables to help you get started.

If you have additional questions or have not received a copy of the draft Data Management Plan, please contact Susan Wenberg at (703) 841-5550. Please fax completed surveys to Susan Wenberg at (703) 841-6777 no later than May 6, 1994.



**BUCKS
COUNTY
Planning Commission**

Robert E. Moore, Executive Director

COUNTY COMMISSIONERS:
Chairman, ANDREW L. WARREN
MARK S. SCHWEIKER
SANDRA A. MILLER

PLANNING COMMISSION:
Chairman, Matthew W. Hallowell
Vice Chairman, Susanne McKeon
Secretary, Harold W. Tesno, Sr.
Daniel K. Cook
Robert H. Grunmeyer
Geryl D. McMullin
James J. Stoeckhert
Joseph G. Szafran, Jr.

May 5, 1994

Ms. Susan Wenberg
American Management Systems, Inc.
Environmental and Health Systems Group
8th Floor
1777 North Kent Street
Arlington, VA 22209

Subject: Delaware Estuary Potential RIMS Partners Survey

Dear Ms. Wenberg:

Please find attached a copy of our response to the potential RIMS partners survey.

Should you have any questions, please feel free to contact Vitor Vicente of my staff at (215) 345-3423.

Sincerely,

Robert E. Moore
Executive Director

REM/VV:krc

Attachments

BUCKS COUNTY PLANNING COMMISSION
Delaware Estuary Potential RIMS Development Partners
May 5, 1994

Hardware	Capability	Concerns & Issues
UNIX or PC Server	Have Unix server (used for GIS development and applications); hard-drive and on-line storage (enhancement would be required with RIMS program participation); and various Apple/Macintosh workstations.	Any participation in the program would have to conform to existing hardware and software, and the long-term capital program acquisition plan. Other concerns include: ability of communication between our system and the proposed RIMS' system; availability of technical assistance; availability of funding to install hardware and software to permit (or speed) accessibility; and staffing costs for maintaining and formatting system and data files.
Modems	Have 9600 baud modem.	Would need dedicated phone line, 19000 baud modem, file transfer software.
Internet Access	No access at this time. No immediate plans to become a subscriber due to current cost/benefit ratio.	Cost of membership, costs of additional hardware and software for Internet access, and average costs per individual access call.
Data Devices	Have CD ROM reader, 60 MB and 150 MB streaming cartridge, and 8mm five GB tape drive.	Potential technological and functional obsolescence of existing data devices and ability to upgrade in a timely fashion.
Back-up System	Have CD ROM reader, 60 MB and 150 MB streaming cartridge, and 8mm five GB tape drive.	Potential technological and functional obsolescence of existing data devices and ability to upgrade in a timely fashion.
Data Manager's Workstation	Have Sun Sparc-2 and Tektronix 4336 workstations.	Time demands on our designated data manager to answer calls and manage the system under RIMS participation.
Bulletin Board System	Have ability, but not currently a part of any external network.	Ability to communicate appropriately with other operating systems.

Hardware	Capability	Concerns & Issues
Data Source Index	Not available.	How the files will be formatted to re-create or link with other systems.
Data Depot	Not available.	None at this time.
Management Utilities	Not available.	None at this time.
Personnel	Capability	Concerns and Issues
Systems Administrator	Have GIS Administrator.	Time demands on GIS administrator to answer calls, give advice, and manage the system under RIMS participation.
Data Manager	Have several data managers with defined responsibilities and projects.	Time demands to help operate and manage the system under RIMS participation.

Experience:

Have significant experience with the management and development of various databases; the use and development of various types of mainframes, workstations, and PCs; programming with several operating systems including DOS, Unix, Vax, and Apple/Macintosh; and development of many GIS based projects and applications (e.g., Employer Trip Reduction (ETR), emergency vehicle routing, watershed modelling, demographic analysis, cartographic modelling).

Additional Comments:

We attended one RIMS meeting, reviewed the draft RIMS proposal, responded to several data management surveys, and have been very involved with the activities of the Local Governments Committee. Based on a preliminary assessment, we anticipate there will be numerous costs associated with RIMS participation. We recommend that short- and long-term cost estimates be developed to give potential program participants an idea of the "bill of goods" they are being asked to buy. Also, we are not sure about the staffing requirements we will have to commit to participate in RIMS. The ultimate decision to participate in this program will depend on operating costs to be incurred; the benefits to be derived; funding availability to acquire additional needed equipment (short-term) and upgrades to the system (long-term); cost of alternative sources of information; and methods to disseminate own information. We recommend that the points we raised in letter of March 17, 1994, to Robert Nyman be addressed (including the establishment of a pilot program to determine the feasibility of RIMS system being proposed). Finally, we also recommend that the proposed RIMS system have the ability to interface with GIS databases and systems, and facilitate the development and dissemination of GIS data.



State of New Jersey
Department of Environmental Protection and Energy

Robert C. Shinn, Jr.
Commissioner

May 5, 1994

Ms. Susan Wenberg
AMS
1777 North Kent Street
Arlington, Va 22209

Dear Susan,

I have enclosed a brief description of our worksite and system. At this time we think it would be inappropriate for a state organization to be a site for the RIMS. Rather we see our role as a data provider. Presently we do this on tape, not on-line. In the future we will sell CD's of data through our map sales office. If you have additional comments or questions please give me a call (609) 633-8144.

Sincerely,

Lawrence L. Thornton
Research Scientist

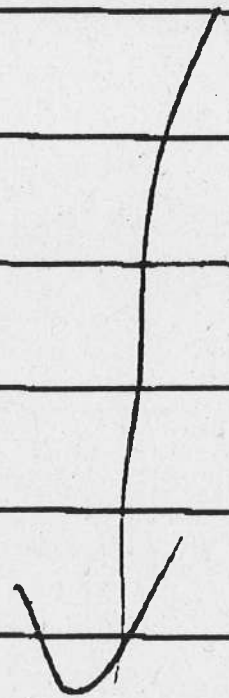
Using the following charts, please note how your organization's capabilities match the RIMS requirements. For each component, please include the following:

Capability: Do you currently provide or have the ability to provide this component? If so, what is the current function of the component? Based on current functionality, would the component need to be enhanced for RIMS usage (e.g., we currently have an electronic index of in-house data, but software would need to be modified to provide remote access capability)?

Do you plan to provide this functionality in the near future?

Also note if your organization cannot provide specific components to RIMS.

Concerns and Issues: Are there any concerns or issues that DELEP should be aware of before implementing RIMS at your location? For instance, please note any recommendations about change in design (e.g., we prefer to use a 486 PC with 1/2 gigabyte of storage capacity rather than the recommended UNIX workstation with 1 gigabyte of storage). If the component does not exist but you are willing to work with DELEP to provide the component, do you have any ideas about how to add it to your current infrastructure?

Hardware	Capability	Concerns and Issues
UNIX or PC Server	SUN 670 server	All of this presently dedicated to DELEP stuff & functions.
Modems	8 - 9600 Baud Peripherals 8 - DUMS	
Internet Access	planned for Fall 94	
Data Devices (e.g., tape & CD ROM drives)	2 - 8 mm 1-CD on PC 2 - 150 2 - CDs on SUN	
Back-up System	Back-ups on tape daily off sun to 3mm. Harvard & Colorado on PCs.	
Data Manager's workstation or PC & modem		
Printer	Space laser printer. Tek phase printer. Epson (dot matrix) Mac Apple Laser with II, NTX.	

Software	Capability	Concerns and Issues
Bulletin Board System	GPS Bulletin Board mpc	
Data Source Index	Data that are distributed is listed and documented (cataloged) in the system.	
Data Depot (optional)	Our system has about 16 meg distributed with no free space.	
Management Utilities		

Personnel	Capability	Concerns and Issues
System Administrator	yes 1	Not available for additional tasks.
Data Manager	yes 1	11

As mentioned in the cover letter, please provide any additional details that may help DELEP reach a decision. Please provide as much information as possible. For example, you could include your connection to the Delaware estuary program, experience in data handling, potential costs for implementation and maintenance, and level of involvement in the estuary program. Below are a couple of examples to help you.

- 1) This organization has attended both RIMS design sessions, reviewed the draft Data Management Plan, and been very involved in all other aspects of the estuary program. To assist in implementation, our organization can supply the proposed UNIX workstation, telephone lines, and building facilities for an annual cost of \$25,000, but we would need another organization to develop the software. Users should be able to access the workstation through internet in approximately a year. Until then, some users will have to use a long-distance number to access RIMS. In addition, we would provide a part-time data manager at no cost.
- 2) Assuming DELEP or another organization purchased the hardware, we could develop the necessary software in ten months for a cost \$275,000. After system development, we could provide the data manager with 40 hours of system maintenance support each month in lieu of the proposed system administrator. We would also enhance the software when and if upgrades become necessary.

Approximately 40 area businesses now dial in to the access server to access the various modules of the PLAN. Standard telephone lines are utilized, and the Maritime Exchange does not, and has no future plans to, provide toll-free access to out-of-state users. We will consider using leased lines at the expense of the user.

In order to participate, users must have their own IBM or compatible PC's and Hayes-compatible modems. Communications software is provided by the Maritime Exchange. All printing is done remotely.

Current hardware is sufficient for all current and near-term projected system needs. System capacity may or may not accommodate any new projects under consideration, depending upon the level of service provided. The PPME would be willing to consider the use of multiple servers and/or operating systems or Wide Area Networks if necessary.

B. Components

In addition to the off-the-shelf programs used by PPME administrative staff (such as Word Perfect, 123, etc.), there are three fully-operational modules of the PLAN and one proposed project currently under consideration which are used both internally and by external users.

External programs are all proprietary and utilize the RPG programming language, using a product developed by California Software. These include:

1. TRACS -- The cornerstone of the PLAN, TRACS processes manifest information for import, waterborne cargoes through the U. S. Customs Service's Sea Automated Manifest System (AMS). Through TRACS, steamship agents, brokers, terminal operators and other port businesses can receive electronic cargo status notifications 24 hours a day, 7 days a week. Manifest data is electronically updated, and no paperwork or signatures are required to move cargo for most AMS participants.

A dedicated workstation dials U.S. Customs every 20 minutes to update the database. This is done automatically utilizing NSA SDLIC communications.

Possible future enhancements to this module include an Air AMS interface and a link to the Automated Export System upon its implementation.

Funding is provided primarily by the Delaware River Port Authority. Currently, user fees are assessed only to those businesses outside the port region which utilize this system, but this may be expanded to include all users at some time in the

future.

2. Ship Reporting -- Since 1875, the Maritime Exchange has been providing vessel arrival and departure information to the tri-state port community. These programs were initially computerized in 1984 and provided in electronic format to port businesses in 1992. Users can view vessel history and/or print selected reports on demand through this module. Funding is provided by subscribers of this service.

3. Sensitive Cargo Tracking -- This system was initiated in 1990 at the request of and funded by the State of Delaware. It captures vessel and cargo information for tankers and barges carrying petroleum and/or chemical products and provides it to the U.S. Coast Guard and other spill response or environmental organizations. Though still in a pilot phase, the Sensitive Cargo Tracking system captures 100% of the tanker traffic and approximately three-fourths of Delaware River and Bay barge traffic.

Most information is updated automatically either from the TRACS or ship reporting programs. There is a dedicated workstation to automatically dial into the Maritrans' network to update their barge data electronically. Other information is keyed by local steamship agents and barge operators.

4. VTIS -- The Vessel Traffic Information System is currently in the initial design phase and is being developed jointly by the Maritime Exchange and Pilots' Association for the Bay and River Delaware. There are currently no users other than the personnel of the two organizations. Communications routines utilizing ProComm scripting automatically send and receive the information.

5. WTIS -- The World Traffic Information System was initially developed at the request of the Delaware River Port Authority. System design included providing information on community events, statistical and trade data, financial information, and electronic business directory information. Prospective participants include traditional port businesses, financial institutions, academic institutions, government agencies, and trade associations. While no additional effort has been made subsequent to the initial programming, it is our intention to re-address this project in the near future.

6. Internet -- There is no currently no Internet connection, but we would hope to establish one due to the fact that the U.S. Customs Service has indicated it may provide access to its systems via the Internet.

C. Personnel

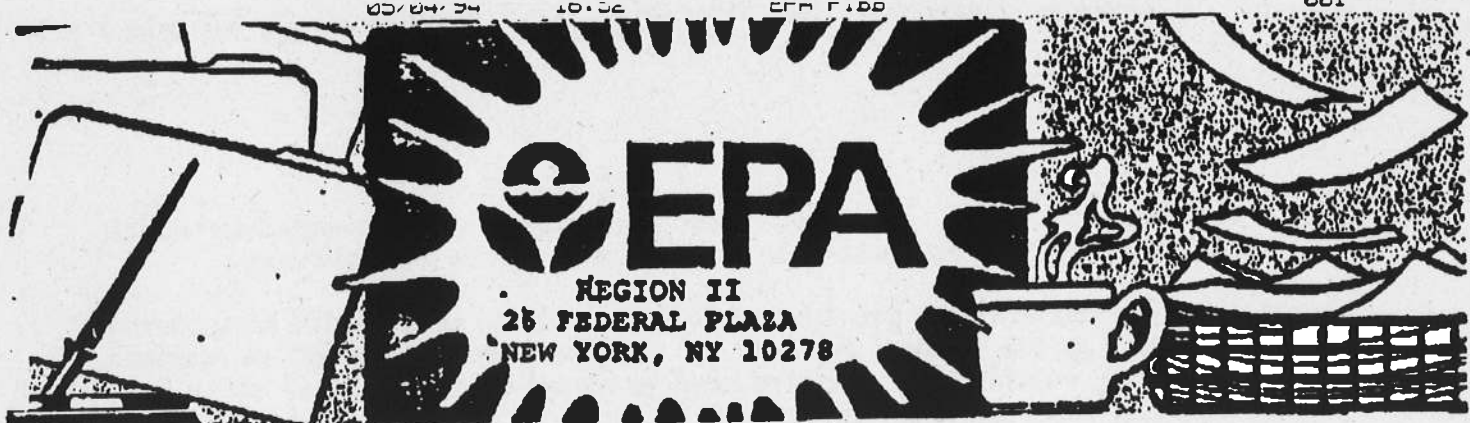
The PPME Computer Operations Manager is responsible for all system operations and technical support. Programming is done

off-site. With the exception of the ship reporting programs, which are maintained solely by PPME dispatching staff, data entry is done primarily via file transfer and/or on-line input by the system users. Again, depending upon the level of service provided to RIMS users, PPME staff may be available for technical assistance.

D. Physical Space Requirements

The project would have to be defined further prior to addressing this issue.

I hope this information is useful. Please feel free to call me at (215) 925-2615 if you have any questions or need additional information.



OFFICE OF THE ASSISTANT REGIONAL
ADMINISTRATOR FOR POLICY & MANAGEMENT

Telephone Number: 212-264-2520
Fax Number : 212-264-9695

TRANSMITTAL FORM

TODAY'S DATE: 5/4/94

TO: Susan Wenberg
OFFICE #: 703/841-5550
FAX #: 703/841-6777

FROM: Harvey Simon
OFFICE #: 212/264-1361

NUMBER OF PAGES SENT INCLUDING THIS COVER SHEET: 3

MESSAGE: I am the main point of contact for Region
II's GIS program. Basically, we could potentially
assist RIMS with our own data and
equipment resources, but would be unable
to provide staff to support the project.

Using the following charts, please note how your organization's capabilities match the RIMS requirements. For each component, please include the following:

Capability: Do you currently provide or have the ability to provide this component? If so, what is the current function of the component? Based on current functionality, would the component need to be enhanced for RIMS usage (e.g., we currently have an electronic index of in-house data, but software would need to be modified to provide remote access capability)?

Do you plan to provide this functionality in the near future?

Also note if your organization cannot provide specific components to RIMS.

Concerns and Issues: Are there any concerns or issues that DELEP should be aware of before implementing RIMS at your location? For instance, please note any recommendations about change in design (e.g., we prefer to use a 486 PC with 1/2 gigabyte of storage capacity rather than the recommended UNIX workstation with 1 gigabyte of storage). If the component does not exist but you are willing to work with DELEP to provide the component, do you have any ideas about how to add it to your current infrastructure?

Hardware	Capability	Concerns and Issues
UNIX or PC Server	Have partially connected (for UNIX to PC file transfer) UNIX AND PC-LANS.	Currently not possibly could be made
Modems	Dial in to PC-LAN System	available for
Internet Access	ON UNIX systems and for Internet E-MAIL on PCs.	data storage and and access, but would not
Data Devices (e.g., tape & CD ROM drives)	9TRACK, 150MB, 8mm, CD-ROM, DISKETTS	be able to maintain the system - would have to be done
Back-up System	Yes	managers responsibility
Data Manager's workstation or PC & modem	NO	
Printer	Variety of color and B/W printer available	

NOTE: EPA Region II could ~~possibly~~ provide the use of equipment to support RIMS, but would probably not be willing to maintain the system with existing staff. We could conceivably work with the Data Manager to provide some of the data storage and communication for the system.

Software	Capability	Concerns and Issues
Bulletin Board System	We have tools to, access BB's services but do not maintain any ourselves	
Data Source Index	?	
Data Depot (optional)	?	
Management Utilities	DBASE, UNIX ORACLE w/ case tools, clipper	

Personnel	Capability	Concerns and Issues
System Administrator	We have both UNIX and PC-LAN SYSTEM ADMINISTRATORS	They would maintain the main our infrastructure but would not specifically support RIMS
Data Manager	We have a GIS system administrator	Would not be directly involved in maintaining RIMS but could supply data

As mentioned in the cover letter, please provide any additional details that may help DELEP reach a decision. Please provide as much information as possible. For example, you could include your connection to the Delaware estuary program, experience in data handling, potential costs for implementation and maintenance, and level of involvement in the estuary program. Below are a couple of examples to help you.

- 1) This organization has attended both RIMS design sessions, reviewed the draft Data Management Plan, and been very involved in all other aspects of the estuary program. To assist in implementation, our organization can supply the proposed UNIX workstation, telephone lines, and building facilities for an annual cost of \$25,000, but we would need another organization to develop the software. Users should be able to access the workstation through internet in approximately a year. Until then, some users will have to use a long-distance number to access RIMS. In addition, we would provide a part-time data manager at no cost.
- 2) Assuming DELEP or another organization purchased the hardware, we could develop the necessary software in ten months for a cost \$275,000. After system development, we could provide the data manager with 40 hours of system maintenance support each month in lieu of the proposed system administrator. We would also enhance the software when and if upgrades become necessary.



GERALD M. HANSLER
EXECUTIVE DIRECTOR

DELAWARE RIVER BASIN COMMISSION
P O. BOX 7360
WEST TRENTON, NEW JERSEY 08628-0360

609) 883-9500
FAX (609) 883-9522

HEADQUARTERS LOCATION
35 STATE POLICE DRIVE
WEST TRENTON N. J.

May 6, 1994

Ms. Susan Weinberg
American Management Systems, Inc.
1777 North Kent Street
Arlington, Virginia 22029-2166

Dear Ms. Weinberg:

The Delaware River Basin Commission (DRBC) has a sincere interest in implementing the Regional Information Management System (RIMS) for the Delaware Estuary Program (DELEP). In implementing RIMS, the Commission would provide information and assistance to users in a manner that will be convenient and cost-effective; provide data in both electronic and non-electronic formats; promote easy access via voice and/or modem telephone connections; utilize existing staff that are knowledgeable about the estuary and the various data sources; and periodically assess the utility of RIMS to determine if the information objectives of the DELEP are being fulfilled. We feel it is important for DELEP to have an organization with current knowledge of and involvement in the issues of the estuary to implement RIMS.

Much of the RIMS water quality function is currently being performed by my staff. Water quality, waste discharge and other water data are provided to many businesses, governmental entities and citizen requests. The Commission's Public Information Officer has experience and knowledge about water related activities in the Basin and is sensitive to the proprietary considerations of certain information. When technical questions arise, other staff members are called upon to assist. Staff have user accounts in the U.S. Environmental Protection Agency's STORET, BIOS, PCS, ODES, IRIS databases, the U.S. Geological Survey ADAPS system and other sources. When needs arise, access to additional databases can be obtained. Staff utilize a variety of data sources in preparing the biennial 305(b) report, Water Quality Assessment for the Delaware River and Bay.

The Commission has a technical library which contains a great deal of information that is not readily obtained elsewhere. Furthermore, the Commission has an active public outreach program through the Public Information Office. Staff have participated in many of the DELEP public information activities and served on many of the program's advisory committees.

It is envisioned that the DRBC would implement the RIMS in two phases. Within the phases, there are different resource demands, some of which require budgetary support. The phases represent three distinct means of accessing information based on user sophistication: telephone/fax, BBS and INTERNET. By using one or all of the three methods of interfacing with RIMS, the user will have the ability to locate and identify available data using "one stop shopping" for information.

Ms. Susan Weinberg

Phase 1

To initiate Phase 1, DRBC will provide support of one-half staff year and DRBC equipment to provide retrievals for the data bases listed above. DELEP would provide one-half staff year support.

The Commission's Computer and Data Management staff would begin solicitation of bids for a PC and Bulletin Board System (BBS) software. Concurrently, staff would begin investigation to obtain access to INTERNET, so that data and information queries and file transfers could be handled via E-MAIL. Access to RIMS via INTERNET will occur during this phase. INTERNET access is fundamental for the transfer of data because of its File Transfer Protocol. Specifications for a UNIX server would be developed and bids prepared. Since the UNIX server is a large budget item, purchase would be postponed until implementation of Phase 2.

It is anticipated that during this phase, the Data Provider Survey information will be heavily utilized. Efforts would begin to gather additional data sources for information not routinely handled by the DRBC.

Once the dedicated PC for RIMS has been acquired, a separate telephone line for the BBS will be installed. The BBS software will be loaded and beta testing will begin. It is envisioned that the BBS will serve to accept information requests as well as to provide a menu listing the availability of data from other sources. During this phase, a one-user BBS would be implemented, rather than the multiple user system. The software for the one user BBS is \$150, while the multiple user software is \$800.

The Computer and Information Management staff will begin to compile information to be placed in the Data Depot. Development of the Data Source Index will begin. The programming of the Data Source Index will likely require the assistance of a consultant. The skills of the Commission's librarian will be utilized to develop the hard copy of the data source index and cataloging of the textual abstracts that will be solicited from the data providers. The librarian, computer and information management staff and the consultant will work together to pseudocode a program that will meet the needs of the users.

Funding will be needed. The DRBC and the DELEP will both benefit from the INTERNET access, so this will be a shared cost. If the DRBC is selected to implement RIMS, cost distribution can be discussed. The consultant fees for development of the Data Source Index will be the responsibility of the DELEP. Similarly, the BBS software and the PC are the responsibility of the DELEP. Overhead costs would be paid by the DELEP. Because of the added responsibilities of various DRBC staff, funding for one-half staff year is requested. This cost is estimated to be \$60,000, including overhead.

Phase 2

This phase would begin to fully implement RIMS. Sufficient information will have been collected to determine the computer resource needs. During this phase, the UNIX server will become operational and the Data Depot will become accessible to users. The Data Source Index will be loaded onto the UNIX server. Additional modems will be installed to meet user demand.

Ms. Susan Weinberg

DELEP would be responsible for funding the UNIX Server; overhead costs for additional telephone lines; BBS software; and staff support of one and one-half staff years. DRBC would continue to provide one-half staff year of support.

In summary, by utilizing the Commission to implement RIMS, the Delaware Estuary Program would begin with the following advantages:

- Immediate implementation with a low start-up cost
- An experienced and knowledgeable staff to serve the user community
- Phased implementation based on resource needs

If you have any questions or wish to discuss the proposal further, please contact Mr. David P. Pollison at extension 255.

Sincerely,


Gerald M. Hansler

c: **Bruce Hargreaves, Ph.D.**
Robert Nyman, EPA Region II

1:30 Jw

U.S. FISH AND WILDLIFE SERVICE



DELAWARE ESTUARY PROJECT

R.D. 1, Box 146-A, Smyrna, Delaware

Phone 302-653-9152 Fax 302-653-9421

TO: Rose Watt

FROM: Greg Beese

TOTAL NUMBER OF PAGES INCLUDING THIS SHEET: 1

COMMENTS: Thanks for the FAX.

I discussed with my Project Leads.

Although we will be very active in providing data
and using RIMS, we do not have the
resources to provide any components.

Take Pride in Delaware Bay!

AMS American Management Systems, Inc.**Telefax Address Form**FAX Phone Number: **(703) 841-6777.**FAX Location: **Environmental and Health
Systems Group
8th Floor
1777 North Kent Street
Arlington, VA 22209-2100****To****Name:
Organization:
Extension:
FAX Number:**Bob NymanUS EPA212 264 5565212 264 4690**From****Name:
Extension:**Susan Wenberg703 841 5550**Date:**5/17/94**Number of Pages:** 3 (Including this sheet)**Remarks:** Response from PA DER's Michael Goughan
(for Tom Baldwin & Jim Walsh). Hopefully you have
rec'd the Data Mgmt Plan. Good luck with RIMS
& let me know how it goes or if you need
more help.

Using the following charts, please note how your organization's capabilities match the RIMS requirements. For each component, please include the following:

Capability: Do you currently provide or have the ability to provide this component? If so, what is the current function of the component? Based on current functionality, would the component need to be enhanced for RIMS usage (e.g., we currently have an electronic index of in-house data, but software would need to be modified to provide remote access capability)?

Do you plan to provide this functionality in the near future?

Also note if your organization cannot provide specific components to RIMS.

Concerns and Issues: Are there any concerns or issues that DELEP should be aware of before implementing RIMS at your location? For instance, please note any recommendations about change in design (e.g., we prefer to use a 486 PC with 1/2 gigabyte of storage capacity rather than the recommended UNIX workstation with 1 gigabyte of storage). If the component does not exist but you are willing to work with DELEP to provide the component, do you have any ideas about how to add it to your current infrastructure?

Hardware	Capability	Concerns and Issues
UNIX or PC Server	LIMITED AVAILABILITY	DER CANNOT SUPPORT THE SYSTEM AS PLANNED
Modems	NOMODEMS ON THE NETWORK OR NON DEPARTMENT AREA	
Internet Access	LIMITED TO E-MAIL SERVICE ONLY	
Data Devices (e.g., tape & CD ROM drives)	LIMITED AVAILABILITY	
Back-up System	NONE	
Data Manager's workstation or PC & modem	NONE	
Printer	NETWORK ONLY	

Software	Capability	Concerns and Issues
Bulletin Board System	NONE	/
Data Source Index	ARC/INFO	LACK OF AVAILABLE SESSIONS TO SUPPORT THIS
Data Depot (optional)		/
Management Utilities	NONE	/

Personnel	Capability	Concerns and Issues
System Administrator	NONE	/
Data Manager	NONE	/

As mentioned in the cover letter, please provide any additional details that may help DELEP reach a decision. Please provide as much information as possible. For example, you could include your connection to the Delaware estuary program, experience in data handling, potential costs for implementation and maintenance, and level of involvement in the estuary program. Below are a couple of examples to help you.

- 1) This organization has attended both RIMS design sessions, reviewed the draft Data Management Plan, and been very involved in all other aspects of the estuary program. To assist in implementation, our organization can supply the proposed UNIX workstation, telephone lines, and building facilities for an annual cost of \$25,000, but we would need another organization to develop the software. Users should be able to access the workstation through Internet in approximately a year. Until then, some users will have to use a long-distance number to access RIMS. In addition, we would provide a part-time data manager at no cost.
- 2) Assuming DELEP or another organization purchased the hardware, we could develop the necessary software in ten months for a cost \$275,000. After system development, we could provide the data manager with 40 hours of system maintenance support each month in lieu of the proposed system administrator. We would also enhance the software when and if upgrades become necessary.

E. RIMS Data Source Index

To use this index, select data sources from the next two pages. Then match that data source ID # with the contact organization on this page with the same ID #.

<i>ID</i>	<i>Organization</i>	<i>Primary Contact</i>	<i>Contact's Title</i>	<i>Phone #</i>	<i>Fax #</i>
1	DE River Basin Com	Warren Huff	Water Res Planner	609-883-9500	609-883-9529
2	NJDEPE	James Mumman	Administrator	609-292-1623	609-292-7340
3	Assoc NJ Envi Com	Kim Crumrine	Resource Ctr Asst	201-539-7547	201-539-7713
4	Dept Natural Res	Richard Lathrop	Asst Professor	908-932-9631	908-932-8746
5	Haskin Lab,Rutgers	John Kraeuter	Assoc Director	609-785-0074	609-785-1544
6	NOAA	Frank Steimle	Res Fish Biologist	908-872-3059	908-872-3088
7	Mont Cty Plan Comm	Michael Stokes	Assoc Director	215-278-3729	215-278-3941
8	USGS	Curtis Price	Hydrologist	609-771-3900	609-771-3915
9	RMC Envi Services	George Potera	Princ Envi Scientist	610-948-4700	610-948-4752
10	DE Hist Preserva	Alice Guerrant	Hist Archaeologist	302-739-5685	302-739-5660
11	Versar	William Burton	Scientist	410-964-9200	410-964-5156
12	Rich Stockton Coll	Matthew Landau	Assoc Professor	609-652-4578	609-748-5515
13	NJDEPE	Lawrence Thornton	Research Scientist	609-633-8144	609-292-7340
14	NJDEPE	Kathleen Clark	Senior Zoologist	609-628-2103	
15	USFWS	Clifford Day	Supervisor	609-646-9310	609-646-0352
16	USFWS	Kelly Wolcott	Asst Manager	609-463-0994	609-463-1667
17	Rutgers Univ	Donald Stearns	Asst Professor	609-225-6165	609-225-6495
18	US Army Corps Engr	Tricia Faust	Water Resrc Planner	215-656-6562	215-656-6543
19	Versar	Jeffrey Frithsen	Senior Scientist	410-964-9200	410-964-5156
20	NJ Bur Shellfish	Joseph Dobarro	Biologist (Fish)	609-785-0730	609-785-1544
21	DE DNREC	Carolyn Otto	Sys Administrator	302-739-4771	302-739-3491
22	DE DNREC	Ellen Dickey	Envi Scientist	302-739-4771	302-739-3491
23	DE Cty Plan Dept	Karen Holm	Principal Planner	215-891-5213	215-891-5203
24	NJ Conservation Fnd	Stephen Howard		201-539-7540	201-539-9439
25	DE DNREC	Roy Miller		302-739-3441	302-739-6157
26	Gloucester Imp Auth	Marur Dev	Senior Engineer	609-848-4002	609-478-6196
27	USGS	Judy Denver	Hydrologist	302-734-2506	302-734-2964
28	E Nature Society	Lorraine Fleming	Manager	302-239-2334	302-239-2473

<i>ID</i>	<i>Type of Data</i>	<i>Time Period</i>	<i>Study Area</i>
1	Water, Water Quality	1967-present	DE Estuary and Bay
1	Water, Water Quality	1968-present	DE Estuary and Bay
1	Water, Water Quality	1987-1989	DE Estuary and Bay
1	Water, Water Quality	1980-present	DE Estuary
1	Water, Water Quality	1991-present	DE Estuary and Bay
1	Water, Water Quality	1991-present	DE Estuary and Bay
1	Water, Water Quality	1991-present	DE Estuary and Bay
1	Regulatory, Facility	1967-present	DE River Basin
2	Water, Water Quality	1912-present	NJ side DE Bay, inlet to Artif Is
2	Water, Water Quality	1989-present	NJ side DE Bay, inlet to Artif Is
2	Biological, Species Composition	1986-present	DE Bay near Deadman Shoal
4	Biological, Land Cover Level I	1991	NJ
5	Biological, Pelagic Fauna	1953-1990	Primarily Eastern Half
5	Biological, Recruitment	1953-1991	Primarily Eastern Half
5	Biological, Recruitment	1953-1992	NJ
5	Biological, Recruitment	1956-1983	One Lower Bay Site
5	Biological, Mortality	1958-1992	NJ
5	Biological, Mortality	1958-87/1990-92	NJ
5	Biological, Mortality	1959-1992	One Lower Bay Site
5	Biological, Health	1958-1992	NJ Seed Beds and Lower Bay
5	Biological, Yield, Landings	1956-1991	NJ
5	Biological, Yield, Landings	1948-1991	NJ
5	Water, Hydrography	1953-1990	Primarily Eastern Half
5	Water, Hydrography	1972-1991	Maurice River
6	Biological, Benthic Infauna	Mar-Dec 1980	Lower DE Bay near Lewes
6	Biological, Monitoring, Benthic	1990-1994	Lower DE Bay, Browns Shoal
7	Utilities, Treat Plants/Sewer Lines	1993	Montgomery County, PA
7	Utilities, Water Facilities	1991	Montgomery County, PA
7	Utilities, Power Utilities	1992	Montgomery County, PA
7	Cultural, Land Use	1990	Most of Montgomery County, PA
7	Cultural, Land Proposals	1958-present	Montgomery County, PA
9	Biological, Benthic Infauna	1981-present	Trenton-Philadelphia
9	Biological, Zebra Mussel Monitoring	1990-present	Philadelphia area
10	Cultural, Arch Sites, Hist Bldgs	1950	DE (statewide), River and Bay
11	Biological, Ichthyoplankton	1987-88/1992-93	DE River, C&D Canal-Trenton

ID	Type of Data	Time Period	Study Area
11	Biological, Fish Seine and Trawl	1990 (Fall)	C&D Canal--Barlington Island
11	Biological, Striped Bass	1989	Riverton, NJ--Salem River
11	Biological, Striped Bass	1990	C&D Canal--Burlington Island
13	Other, Digital Data	Various	NJ
14	Biological, Animal Tissue	Annual	Salem County, Cumberland County
14	Biological, Bird Survey	Annual May-June	Cape May-Cohansey, Woodland Beach
16	Administrative, Refuse Boundaries	Current	Cape May County
16	Biological, Monitoring Sites	1993-1994	Cape May County
16	Biological, Wildlife Surveys	1994	Cape May County
20	Biological, Finfish Survey	1991-1993	DE Bay, Cape May to Salem
21	Water, Ambient Water Quality	1965-present	DE (statewide)
21	Biological, Fish Tissue	1979-present	DE (statewide)
22	Biological, Macroinvertebrea Surveys	1974-present	DE (statewide)
22	Biological, Habitat	1989-present	DE (statewide)
23	Other, Misc Studies and Information	Depends on Type	DE County, municipalities
23	Other, Historic/Archeology Studies	Depends on Type	DE County, municipalities
23	Transportation, Special Studies/Map	Depends on Type	Region, County, municipalities
23	Other, Land Development Activity	1953-present	DE County, municipalities
23	Other, Misc Studies-Growth, Land Use		DE County, municipalities
24	Biological, Habitat	1991-1992	Salem, Gloucester, Cumber. Cape May
24	Cultural, Land Use Ownership	1991-1992	Salem, Gloucester, Cumber. Cape May
24	Water, Floodplains, Wetlands	1991-1992	Salem, Gloucester, Cumber. Cape May
25	Biological, Juvenile Fishes	Apr-Nov 1980	DE Bay and River, DE side
25	Biological, Adult Fish, Blue Crabs	1990-present	DE Bay, DE side
25	Biological, Striped Bass	May-Jun 1991	DE River near Wilmington
25	Biological, Atlantic Sturgeon	Jun-Oct 1991	DE River, Wilmington, Artificial Is
25	Biological, Amer Oyster Spat Counts		DE Bay, DE Oyster Grounds
27	Water, Streamflow	Various	Selected sites in basin
27	Water, Water Quality Data	Various	Selected sites in basin
28	Water, Water Quality	1986-present	DE
28	Water, Water Quality	1992-present	Red Clay Creek
28	Biological, Benthic	1986-present	DE
28	Biological, Stream Habitat	To Begin 1994	DE
28	Biological, Species Inventory/Plants	1987-present	Northern DE
28	Biological, Reptiles Species Survey	1986-1990	DE
28	Biological, Birds Census Data	1991-present	Burrows Run Preserve, DE

