EIS Software: A Selection Process and the Western Mining Experience

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ABSTRACT

A growing number of organizations are developing executive information systems (EISs) to support the information needs of senior executives. The decision about what software to use is important when building an EIS. The options range from custom-built to full capability vendor-supplied software. When selecting full capability EIS software, a multi-stage process is recommended: end user needs assessment, critical success factor identification, feature analysis and capability review, resource needs assessment, demonstration prototype development, and external user surveys. The Western Mining corporation used a similar process with good results. Based on their experiences, additional insights about selecting EIS software can be gained.

INTRODUCTION

Executive information systems (EISs), or executive support systems as they are sometimes called, are increasingly found in organizations. They oprovide senior executives with easy access to external and internal information relevant to their critical success factors. Many systems also provide support for electronic communications (e.g., e-mail), data analysis capabilities (e.g., decision support systems), and organizing tools (e.g., electronic calendars) [4]. In many organizations, EISs are making senior executives hands-on computer users for the first time.

An important EIS development issue is selecting which software to use. Many EISs have failed because of a poor choice [5]. Prior to the mid 1980's, the options were more limited than they are today. Systems designers could either custom build the software or patch together an assortment of available products, and some firms were successful with this approach. Lockheed-Georgia custom built their EIS software [2], while Phillips 66 used a combination of FOCUS, an IBM demonstration software package, and in-house-developed software [1].

Since the mid 1980's, a wide variety of EIS software has become available. Table 1 provides information about some of these products. The software varies considerably in terms of cost and capabilities. At one extreme is a product like RediMaster that costs less than $1,000 but only has screen design and information display capabilities. Other software products like Lotus 1-2-3 are used to generate and feed the information presented. At the other extreme are products like Comshare's Commander EIS, Pilot's Command Center, and IBM's Executive Decisions which typically result in a software bill in excess of $100,000 but provide a full range of capabilities; see Table 2.

A recent study provides insights about the software currently being used to develop an EIS [6]. Fifty-one organizations with an EIS were surveyed and among the questions asked was whether custom built, a mixture of custom built and vendor software, or vendor software was used. Twenty-two percent of the firms indicated the use of custom built software, 26 percent a mixture, and 53 percent vendor software only. The most popular commercial software products were Commander EIS, Command Center, and EASEL.

TWO APPROACHES

Even with the availability of full capability EIS software, some firms prefer to go with software already available in-house or to purchase software with limited capabilities. There are several reasons for this. An obvious one is cost, as full capability EIS software is expensive. Another reason is to get the initial version of the EIS up and running quickly while executive interest is still high. The time associated with justifying, selecting, purchasing, installing, and learning

Table 1. Selected Commercial EIS Software

Product	Vendor	Description
CA - Strategem	Computer Associates 711 Stewart Avenue Garden City, N.Y. 11530-4787 (516) 227-3300	A set of products that can be integrated to create an EIS
Command Center	Pilot Executive Software 40 Broad Street Boston, MA (617)350-7035	A full capability EIS product
Commander EIS	Comshare 3001 S. State Street Ann Arbor, MI 48108 (313) 994-4800	A full capability EIS product
EASEL	EASEL 600 West Cummings Park Woburn, MA 01801 (617)938-8440	Supports EIS screen design and information presentation
EIS-EPiC	EPiC Software 25 Burlington Mall Road, Suite 300 Burlington, MA 01803 (617)270-0610	A full capability EIS product
FOCUS/EIS	Information Builders 1250 Broadway New York, NY 10001 (212) 736-4433	The Lightship product serves as a front end to the FOCUS database.
Express/EIS	Information Resources 200 Fifth Avenue Waltham, MA 02254 (617) 890-4433	An EIS front end to the Express DSS
EISTool Kit	MicroStrategy One Commerce Center Wilmington, DE 19811 (1-(800) 927-1868	Supports EIS screen design and information presentation
Executive Decisions	Contact local IBM sales representative	A full capability EIS product
Lightship	Pilot Executive Software 40 Broad Street Boston, MA (617) 350-7035	Supports EIS screen design and information presentation
RediMaster	American Information Systems P.O. Box 367 Wellsboro, PA 16901 (717) 724-1588	Supports EIS screen design and information presentation
Resolve	Metapraxis 900 3rd Avenue, 36th Floor New York, NY 10022 (212)935-4322	A full capability EIS product

Table 2. Features of Full Capability EIS Software

Support for multiple user interfaces
On-line, context dependent help screens
Command files
Multiple methods for locating information
Access to external databases (e.g., Dow Jones News Retrieval)
Interfaces to other software (e.g., Profs, Lotus 1-2-3)
Integrated decision support (e.g., System W, IFPS)
Easy screen design and maintenance
Screen design templates
Application shells
Data extraction from existing organizational databases
Graphical, tabular, and textual information on the same screen
Integration of data from different sources
Security for data, screens, and systems
Support for rapid prototyping
System usage monitoring
Support for hard copy output (e.g., paper, overhead transparencies, 35mm slides)

to use the software is less. A final reason is that there might not be a full commitment to the EIS. It may be that the system is viewed as a research and development project and that time and cost are to be minimized until there are strong indications that the project will be successful.

Systems that are successful tend to spread rapidly in terms of number of screens, users, and capabilities. Keeping up with the demands is one of the major challenges faced by the EIS support staff. Firms that have not elected to purchase full capability EIS software may find it especially difficult to keep up because of inherent limitations associated with the software used. For example, it may be difficult to provide integrated access to external databases like Dow Jones News Retrieval. Faced with this situation, firms once again have an important software selection decision. Should they try to kludge on additional capabilities or should they incur the time, cost, effort, and possible negative executive reactions associated with a conversion? Some firms choose to bring in full capability EIS software.

SELECTING FULL CAPABILITY EIS SOFTWARE

Given the cost and potential ramifications associated with the EIS software selection decision, a formal process should be used. An important first step is the formation of the evaluation team. Its composition should include representatives from all of the groups that will be affected by the EIS, including:

- The **executive sponsor** who makes the initial request for the system, makes the necessary resources available, stays on top of the system's development, handles potential resistance, and communicates strong and continuing interest in the system [4].
- The **operating sponsor** who manages the day-to-day development of the system. This person may be an executive but is most typically an information systems manager [6].
- **Executives** who will be the users of the system.
- The **EIS support staff** that will develop and maintain the system. This group should contain business analysts and technical specialists.
- **Functional area personnel** who will provide data to the system.

The EIS software evaluation team provides the rich variety of perspectives that are needed. Each member participates in the team's activities in a way that is appropriate for their perspective; see Figure 1.

The EIS software evaluation team should use a multistage process that might include the following steps:

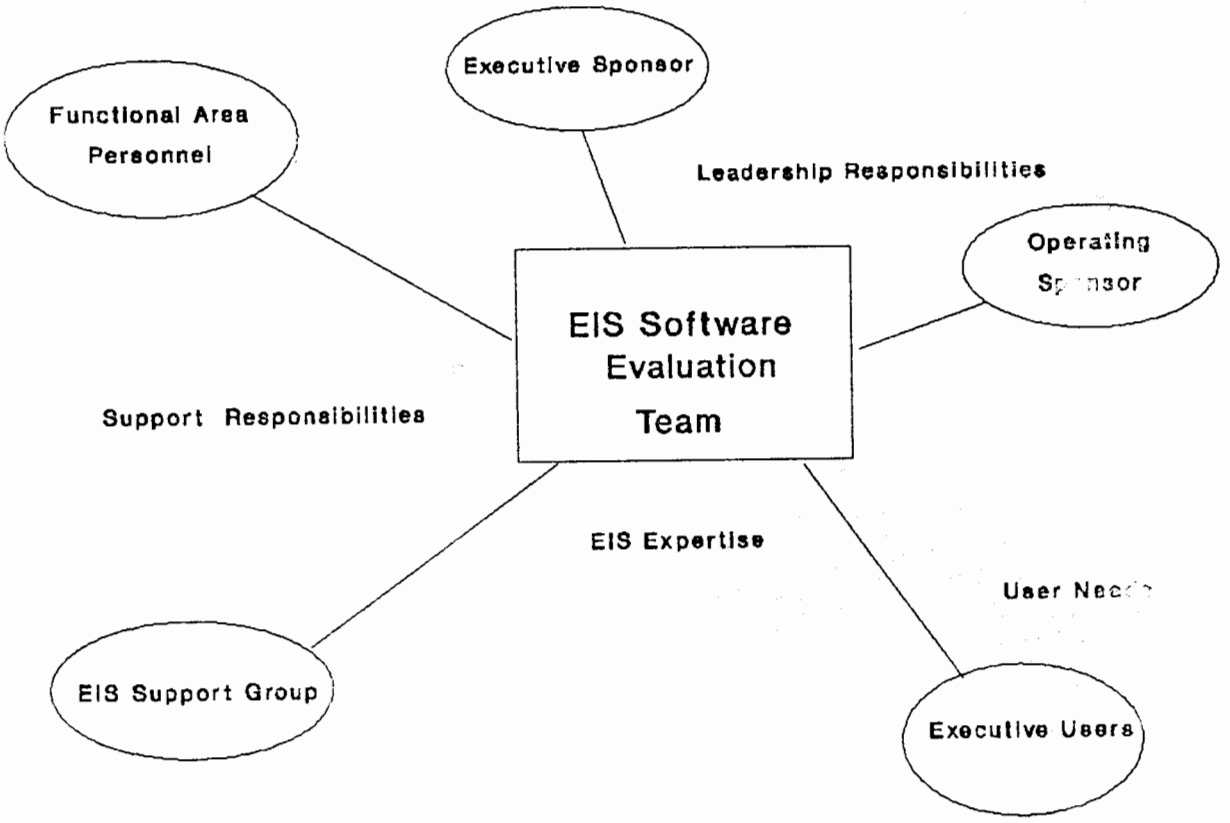
- End user needs assessment
- Critical success factor identification
- Feature analysis and capability review
- Resource needs assessment
- Demonstration prototype development
- External user surveys

This process is similar to one successfully used with DSS software [3].

End user needs assessment is a systematic, organized, and structured procedure for identifying and evaluating features needed in the EIS software. It requires considerable input from future users of the EIS and lays the foundation for the feature analysis and capability review. The assessment may reveal, for example, the need to provide information by functional area, product, and geographical location; the inclusion of e-mail capabilities; and the ability to access external databases.

Critical success factor (CSF) identification establishes a minimum level of performance for key criteria and prioritizes the criteria used in selecting the EIS software. It reflects information gained in interviews with future users and technical people. For example, it may be deemed critical that the software requires no additional hardware, that it supports either a touchscreen or mouse mode of operation, and that its cost be below some maximum level. It needs to be empha-

Figure 1. The EIS Software Evaluation Team



sized that these are CSFs for the characteristics of the system and not the CSFs that drive the system's information contents.

Feature analysis and capability review involves the identification of specific features and capabilities important in evaluating the EIS software alternatives. The alternatives are then evaluated using a checklist of features and capabilities. Possible features include ease of use, graphics capabilities, and methods for handling data. The evaluation can use a weighted ranking method. For each software alternative, the assessment for each feature is quantified and multiplied by a weight that reflects its importance, and the weighted assessments are then summed. The software selection decision should not be driven solely by this process, however, but it can help sort out the better alternatives.

The resource needs assessment explores the computer system resources required by the EIS software alternatives. It examines the computing platforms, operating systems, communications networks, and memory required by various products. This assessment can rule out some of the alternatives. For example, IBM's Executive Decisions requires the use of OS. If an organization already has a network of DOS based machines in place, the required upgrade to machines that support OS may be deemed needlessly expensive.

A prototype EIS should be developed by using the EIS products still under serious consideration. The EIS support staff should actively participate in the development of the prototype in order to gain a good understanding of the use of the vendor's product. EIS software is still in its infancy and limitations and requirements of particular software products often are not apparent until they are used with a challenging application. The prototype should use real data and serve a current organizational need. Future EIS users should view the prototype.

An external survey should be made of the experiences of other organizations using the EIS products being considered. It should explore the product and the support provided by the vendor. The survey should be broader in scope than just a few references provided by the vendors. Depending on timing, it may be possible to attend EIS users group conferences and talk with a large number of users.

THE WESTERN MINING CORPORATION

Western Mining Corporation of Australia recently went through the process of selecting full capability EIS software. Their experiences, especially in the feature analysis and capability review step, should be of interest to other organizations.

At Western Mining Corporation (WMC), the EIS study was initiated by a senior executive. Two managers, one from MIS and one from Accounting, were appointed to oversee the study. Interviews were conducted with twenty representative executives across Australia to roughly determine their information requirements. This exercise revealed many insights and indicated a definite potential for EIS development. Most importantly, it allowed the organization to formulate its own perspective on EIS and to define what EIS could and should do for its executives. With steering committee approval, the software evaluation and selection process began.

The evaluation team consisted of two full-time MIS staff members and a part-time accountant. The decision was made to use a full capability EIS product and two products were selected as candidates. Only two products were considered because of what was available and supported in Australia at the time. Also, each product could run on WMC's existing computing equipment. The evaluation team prepared a business case based on a real problem. The prototype EISs that were developed using the vendors' products were based on the case. A feature analysis and capability review checklist was created to compare the products. What began as a simple checklist became more comprehensive and detailed as the evaluation process proceeded. Appendix A provides the final checklist that was developed, and it might be of use to other firms that are evaluating full capability EIS software.

Three weeks were devoted to the evaluation of each product. The initial week involved vendor demonstrations and some training. During the second week, the evaluation team experimented with various aspects of the software, using the evaluation checklist as a guide. Questions were prepared for the vendor who returned during the third week for assistance in developing the EIS prototype.

It became apparent that the case study was too simplistic to fully explore the potential of the software. Extra time available during the third week allowed the vendor to supplement the case study, demonstrating features of their choice. At the end of the third week, the evaluation checklist was reviewed with the vendor. The checklist was a valuable tool for comparing the products.

Research into the implementation of EIS in the local and international arena was also undertaken to incorporate the experiences of other companies into the study. The net result enabled the project team to confidently recommend a product for detailed evaluation. Steering committee approval was attained to proceed to the next phase.

Over the next six weeks, two EIS applications were developed with vendor assistance. This experience not only served to confirm the software selection decision but also provided further in-house training. The applications developed during this period formed the basis for the initial version of the EIS at Western Mining Corporation.

After selecting the software to develop an EIS, development proceeded rapidly. The product selected proved to be an excellent choice. It is flexible and supports the prototyping process. Several modules were developed, including production performance, health and safety, marketing, and financial information. Modeling facilities for "what if" analysis were incorporated into the financial modules.

The selection process was invaluable in ensuring that the capabilities of the software facilitated the development of the EIS. However, it would have been beneficial during the evaluation process to examine WMC's business processes and existing information architecture more carefully.

A major objective of developing the EIS was to reduce the length of time for information to reach top management. Insufficient consideration was given to determining the real cause of lengthy reporting delays. Executive information systems are often marketed as being able to provide faster access to information by reducing information distribution times. At Western Mining Corporation the real cause of the problem was not the distribution time, but the time taken to consolidate and validate information. This in turn was caused by a lack of standard systems, procedures, and terminology across mining and processing operations.

WMC would also have benefitted from taking a closer look at the existing information architecture before embarking on the EIS trail. This would have determined that fundamental changes to systems and procedures were required to allow the benefits of reduced reporting times to be realized. The EIS project would have been delayed but greater benefits would have been achieved.

WMC is now in the midst of introducing many of the organizational and technological changes that should have preceded the implementation of an EIS. There is a major emphasis on increasing standardization across business units. The corporation is currently in the process of reviewing and establishing a solid information foundation. Recent initiatives toward this end include:

- An Australia-wide corporate information needs analysis to determine key decision processes and the information needed to support these processes.
- An information systems plan was developed which provides the future direction for systems development at Western Mining Corporation.
- A corporate data model is under way, which provides the standard data definitions for all corporate data.

- Technical standards for WMC's computing environment have been established.
- Standards for procedures and terminology are being established.
- Several high priority projects have commenced. In particular, systems are being developed which are common across the mining and processing operations, with an emphasis on production and performance. This will greatly facilitate timely management reporting, at both the operational and corporate level.

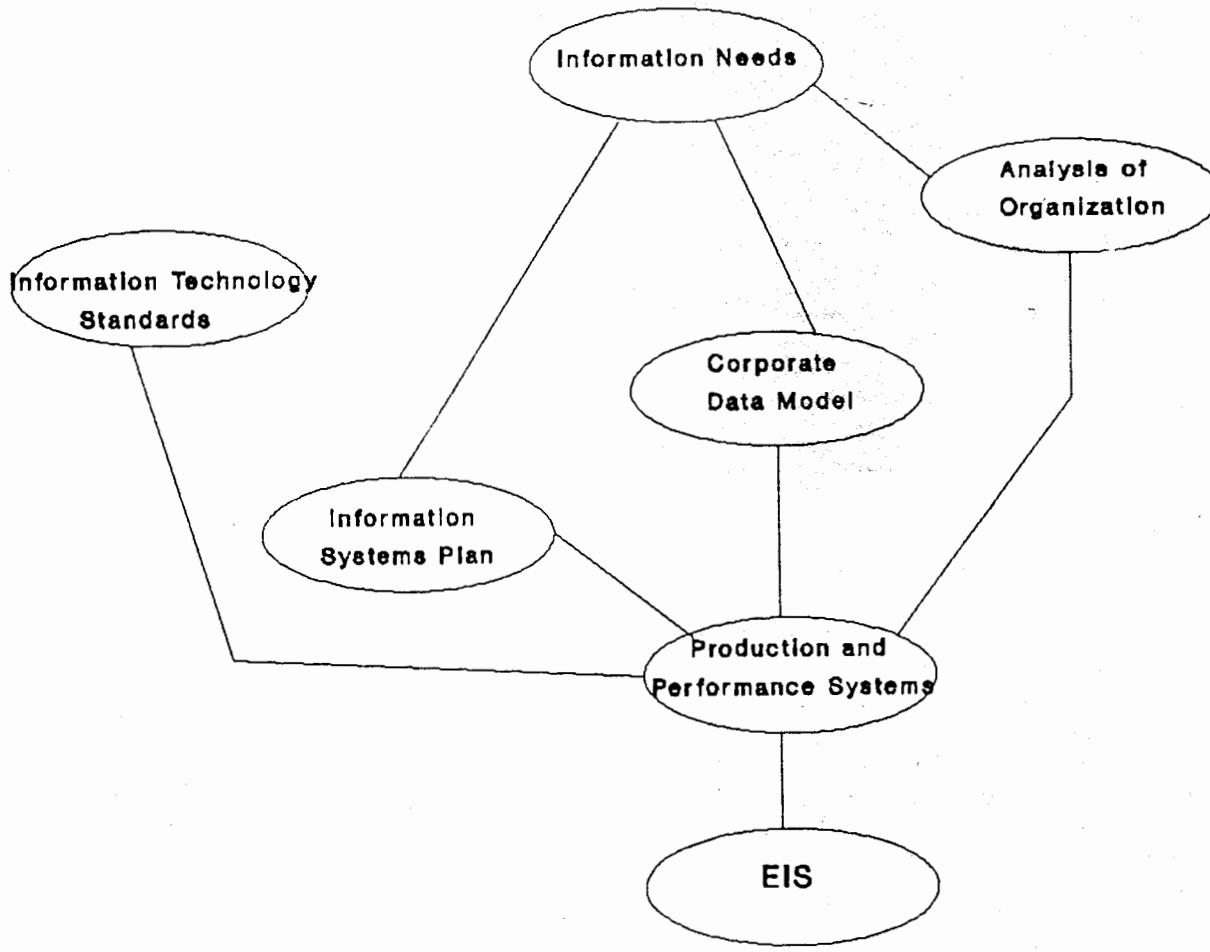
Figure 2 illustrates that WMC's activities of the 90's should ideally have preceded the development of the EIS in the 80's. EIS may have come too early to Western Mining Corporation, but it will remain one of the tools for delivering the right information, to the right place, at the right time.

CONCLUSION

The EIS software selection process used at Western Mining Corporation corresponds closely with the generic process presented earlier. It also shows, however, the iterative and evolutionary nature of the process. The case that provided the basis for the EIS prototype demonstrations was too simple to provide an adequate test of the various products' capabilities and had to be augmented. The feature analysis and capability review checklist evolved as more experience with the EIS products grew. After an initial decision on an EIS vendor's product was made, further testing was conducted in order to confirm the decision.

The WMC experience also illustrates a couple of other important considerations when developing an EIS. Simply overlaying an EIS on existing businesses processes is unlikely to work if the processes themselves are flawed. A technical solution will not remedy a management problem. It is also

Figure 2. Prerequisite activities for EIS



important to review the existing information architecture to ensure that appropriate procedures, standards, and definitions are in place. A failure in this area is likely to result in problems and disruptions when developing the EIS that are time consuming and expensive to remedy.

The EIS software market is experiencing changes that affect buyers in favorable ways. A growing number of PC and LAN-based products (e.g., Pilot's Lightship) are available at lower prices than the mainframe-based alternatives. Some of the products run on a mixed platform of IBM PCs and Apple Macintoshes (e.g., Comshare's Commander EIS). EIS software vendors are forming business partnerships with other software vendors (e.g., Pilot with Information Builders) so that their products can be easily used together (e.g., Lightship and Focus) and other software vendors are adding EIS front ends to their products (e.g., SAS). Some of the EIS products now offer enhanced capabilities such as document search and retrieval (e.g., Comshare's Commander EIS), voice annotation to screens (e.g., IBM's Executive Decisions), video (e.g., IBM's Executive Decisions), and group work support tools (e.g., Pilot's Command Center). Taken together, these developments provide more alternatives, with more capabilities, at more competitive prices.

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APPENDIX A

WESTERN MINING CORPORATION'S CHECKLIST FOR FEATURE ANALYSIS AND CAPABILITY REVIEW

1.0 **Ease of Use**

Development

- Applications to be easy and quick to develop
- New users to be easy and quick to add to the system
- Suitability for quick prototyping
- Display alternative output formats quickly

Learning

- Learning time for developers
- Learning time for users
- Availability of appropriate documentation and tutorials

End User

- Menu system
- Customized menus for each user
- Ability to bypass menus not required
- Various modes of use (mouse, touchscreen)
- Minimal number of keystrokes
- Consistent use of functions

Maintenance

- Easy to add and modify data
- Ability to maintain integrity and timeliness of data (handling of frequent updates)
- Easy to add and modify screens, reports, and graphs
- Availability of standard templates
- Ability to copy existing screens, graphs, etc.
- Ability to monitor system usage
- Easy to add additional users
- Ability to incorporate changes to corporate structure

2.0 **Reporting Capability**

- Reports to be presented as both graphs and tables
- Ability to display graphs, tables, and text on single screen
- Ability to switch between tubular and graphic output
- Ability to color code exceptions on the current screen
- Ability to present a summary screen listing all exceptions throughout the system
- Support analysis of budgeted, actual, and forecast figures
- Effective presentation of time series data
- Ability to highlight variations
- Support interactive user defined variance criteria
- Retrieval of historical data as required
- Maintain historical data and discard after a user defined period
- Analysis of historical data and identification of trends

- Built-in restrictions to protect historical data
- Facility for personalized queries (i.e., ability for users to scan the data base according to interactively defined criteria)
- Explanatory notes to be attached to reports

3.0 **Graphic Presentation**
- Quality of graphics
- Speed of presentation
- Effective use of default color coding
- Ability to highlight areas of concern
- Availability of individual color schemes
- Ability to include explanatory notes for each graph
- Ability to produce a variety of graphs (pie, bar, 3D bar, line)
- Automatic generation of simple, default formats which can be customized
- Easy to produce executive defined graphs
- Automatic scaling
- Graph limitations
- Automatic legends

4.0 **General Functionality**
- Drill down capability
- Built-in statistical capabilities
- Lookaside capability for interrupting a process to use another facility
- Screen scrolling (horizontal and vertical)
- Multiple tasks to be operating and displayed concurrently (e.g., windows, split screens)
- Access to notepad facility
- Integration with DSS
- Import data from spreadsheets/word processing
- Minimal screen repainting
- Ability to display other languages

5.0 **Data Handling**
- Version checking to ensure all users are accessing the same version of software, applications, and data
- Interfaces with external databases and internal WMC systems
- Efficient storage of time series data
- Stored aggregates for rapid access
- Built-in periodicity conversions
- Efficient indexing and retrieval mechanism
- Instantaneous distribution of new data among users
- Ability to consolidate various sources and formats of data into an EIS database via manual input or electronic data transfer from other systems
- Ability to sort screen data according to user defined criteria

6.0 **Output Options**
- Laser printer, plotter, color printer, transparencies, dot matrix
- Large screen presentations for meetings

7.0 **Performance**
- Response times
- PC-mainframe communications uploading and downloading data
- Efficient resource usage
- Capacity issues (i.e., number of users, volume of data)
- Reliability of software
- Recovery facility

8.0 **Electronic Mail**
- Ability to run VAXMAIL
- Ability to incorporate EIS reports and graphs into mail facility

9.0 **Security**
- Restricted system access
- Restricted function access
- Add/edit/delete restrictions for applications and data

10.0 **Environments and Hardware**
- Local access
- Across networks
- Multi-user access to the same data (only 3 users tested)
- Portability
- PC-mainframe links

11.0 **Documentation**
- Reference manual, introductory guide, tutorials
- Overall style of documentation
- Online, context sensitive help screens
- Meaningful error messages
- Appropriate cross-referencing and indexing
- Stand-alone chapters

12.0 **Vendor Support**
- Training courses for developers
- Technical support
- Local support
- Timeliness and smoothness of initial installation
- Availability of off-the-shelf applications
- Availability of source code
- Hot line support

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