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DEPARTMENT OF COMMUNICATIONS
MANAGEMENT USE OF
COMPUTER INFORMATION RESOURCES IN DOC
SITUATION REPORT AND RECOMMENDED ACTION PLAN

MARCH 31,1993

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DEPARTMENT OF COMMUNICATIONS

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EXECUTIVE SUMMARY

INTRODUCTION

In February 1993, the Departmental Informatics Steering Committee (DISC) approved the undertaking of a study proposed by DGIM to examine current usage and identify additional requirements of DOC managers with respect to information provided by the corporate computer systems available to them. This study coincided with DGIM's initiative to consolidate all corporate information systems on a single repository or data warehouse to be provided by the recently purchased Oracle database package.

The original objectives of this study were to determine how well those computer systems are presently serving DOC management's information needs, and to identify the development criteria or functional specifications for the design of a workstation software package that would allow DOC managers better and easier access to computer-based information relevant to their critical success factors.

It became clear during the initial phase of the study that the objective of recommending a managerial workstation software package could not be made with any confidence. The study very quickly revealed certain weaknesses and deficiencies in some of the existing corporate systems. It is these systems that would ultimately supply the information to any proposed managerial workstation. Consequently, it was agreed with DGIM to modify the terms of reference to address the changed situation.

The modified objectives were redefined as "to determine how well existing computer systems are presently serving DOC management's information needs, to identify any additional information requirements of DOC managers, and to investigate and recommend ways that would allow DOC managers and their support staff better and easier access to computer-based information relevant to their critical success factors."

The study was carried out by Microstar Software Ltd. during the period February 15 to March 31, 1993. This document presents their final report on the study.

APPROACH

In order to achieve the objectives indicated above and to arrive at a suggested plan of action, the following tasks, with cooperation from DGIM, were defined and carried out:

- survey a sampling of 48 managers chosen from six Sectors, three Regions, and CRC, and determine their current information and systems usage;
- assess the effectiveness of existing corporate, sector-specific, and other systems available to DOC management in delivering information relevant to their needs;
- determine particular information access problems and identify opportunities for improvement;
- consolidate and summarize manager's information requirements across all organizational units surveyed;
- investigate ways to improve and enhance management's ability to obtain managerial-level information relevant to their needs;
- present conclusions and recommendations, and develop a plan of action.

SUMMARY OF FINDINGS

The study has identified a number of weaknesses and deficiencies with the computer systems currently in place to provide quality information to managers. The considerations on which this judgement is based include:

- an assessment of the existing situation;
- an analysis of findings, problems and opportunities;
- analysis of managerial information requirements.

These weaknesses and deficiencies are attributable to:

- lack of sufficient and accurate quantitative data and management tools to support the demands of managerial work, in particular performance monitoring, query and analysis, statistical and comparative analysis, and organizational planning and control
- inadequate management information for decision-making and for responding rapidly to information demands
- the lack of central authority to deal with informatics management issues

Accordingly, the aim of any changes to existing systems is to support access to more and better information for management decision-making, and to increase the productivity and effective use of staff resources. A recognition of the need to manage information as an asset and a resource is crucial to the success of any changes that may be implemented.

CONCLUSIONS AND RECOMMENDATIONS

DOC's source of information and data storage is in the diverse base of installed functional systems applications. However, this large installed base of computer systems is a patchwork of different processes, dissimilar data, different technologies and partial solutions which cannot readily be interconnected.

The study revealed that existing systems are deficient in two areas: serving the program managers, and meeting strategic information needs. Departmental resource management systems such as ARCS and NMCS exist as separate entities with little cross-functional integration. The implementation of ARCS has not necessarily reduced work for those who have to use it.

Managers want to access, at their desk tops, the type of information which they already provide to functional staff or systems in initiating transactions such as hiring staff or purchasing goods and services. Under the single operating budget concept, they need up-to-date resource management information in order to plan, allocate, and control basic input resources (people, dollars, capital, property) for the delivery of government programs. To achieve this, it is necessary to integrate information currently held in the separate systems within the department.

It is apparent that effective use of automation in corporate applications has received insufficient attention. New initiatives are urgently required to address weaknesses which have led to a proliferation of local, independent applications in many Sectors, duplicated processes, and widespread dissatisfaction with existing corporate applications, especially ARCS in HQ. These new initiatives should include a reassessment of corporate systems architecture, processes and procedures.

In organizations that are information intensive, such as government, information is a strategic resource. Information is the lifeblood of administrative and service delivery functions. The recommendations enumerated below, therefore, emphasize the use and value of information in enhancing individual and organizational productivity and on finding ways of assisting managers in maximizing the use of information in their jobs.

The essence of these recommendations focus on:

- Improving the use of the Department's existing information resources.
- Developing plans for upgrading existing systems or implementing new systems where appropriate.
- Improving the delivery of informatics services and systems.
- Enhancing the confidence managers have in the relevance, accuracy, and timeliness of the information resources they require for decision making and problem solving.

Recommendations include:

- A reexamination of the processes and procedures associated with the ARCS departmental financial system, including ways to improve data access, usability, and user-friendliness.
- An analysis of current data structures with the view of providing a detailed inventory of data elements. This inventory will provide a focus for co-ordinating the development of new systems and enhancement of existing systems.
- The development of a manager's information resource system as a common application which will provide managers with better transaction and decision-making information.
- Improving the technical and functional features of the departmental E-Mail and the Senior Executive Network with the aim of improving performance and functionality.
- A reassessment of DGIM's responsibilities and authority as a provider of informatics services and systems. The current organizational framework for managing DOC's information technologies is blurred and the lines of responsibility among the diverse operational units in DOC is unclear.

SUGGESTED PLAN OF ACTION

It is suggested that the implementation of the above recommendations proceed as follows:

1. Redefinition of DGIM's role, responsibilities and authority.
   Estimated time to complete: 6 - 8 months
2. Perform data analysis and compile detailed inventory of data groupings and data elements.
   Estimated time to complete: 2 to 4 months
3. Re-examine the processes and procedures associated with the ARCS system.
   Estimated time to complete: 2 - 4 months
4. Enhance E-Mail systems including SEN.
   Estimated time to complete: 1 - 2 months
5. Implement a management information resource system.
   Estimated time to complete: 2 - 4 months

1.0 INTRODUCTION

The Informatics Planning Division of Informatics Management Branch (DGIM) with assistance from Microstar Software Ltd. has completed a study of DOC management's use of available computer information systems. The study was approved by the Departmental Informatics Steering Committee (DISC), and coincided with DGIM's initiative to consolidate all corporate systems in a single repository or data warehouse that will reside within a database management package purchased from Oracle Corporation.

The study was carried out during the period February 15 to March 31, 1993. This document presents Microstar's final report on the study.

1.1 Objectives and Scope

The objectives of the study were threefold:

1. To determine how well existing computer systems are serving DOC managers' information needs and to identify any deficiencies.

2. To identify managers' additional information access needs.

3. To investigate opportunities for improvement and recommend ways that would allow DOC managers and their support staff better and easier access to computer-based information relevant to their critical success factors.

The study was to include a review of information access functions in the following selected organizational units within the Department:

ADMPM (Policy Management)
ADMAH (Arts and Heritage)
ADMCM (Corporate Management)
ADMCP (Corporate Policy)
ADMRS (Research and Spectrum)
CRC (Communications Research Centre)
CWARC (Canadian Workplace Automation Research Centre)
EDC (Prairies and Northwest Territories Region)
EDO (Ontario Region)
EDA (Atlantic Region)

During the course of the study, SMAQ requested to participate, and CWARC was unable to contribute due to other commitments.

1.2 Terms of Reference

The original terms of reference as per DOC's Contract Data Sheet authorizing this study are shown below. It is important to note that these terms of reference could not be completely adhered to as it became clear during the early part of the study that the ultimate objective of recommending a managerial workstation software package could not be made with any confidence. The study very quickly revealed certain weaknesses and deficiencies in some of the existing corporate systems. It is these systems that would ultimately supply the information to any proposed managerial workstation. Consequently, it was agreed with DGIM to modify the terms of reference.

The initial objectives of this study were: *"To determine the future information access needs of Departmental management within DOC, to obtain a representative cross section of reporting needs through discussions with a group of managers, to analyze these needs in terms of available information and to provide a conceptual framework relative to the delivery mechanism. It will also identify the development criteria or functional specifications for the design of a work station software package that will meet the above requirement in order to assist departmental management in the effective use of this information."*

In order to realize these original objectives, the following terms of reference were established:

a) *Interview a number of managers at various levels and in three regions to ascertain information access and presentation requirements*

b) *Analyze the results of the interviews conducted and distil out the common characteristics and, if possible, data elements.*

c) *Investigate methods of providing the information requested.*

d) *Document and consider existing equipment limitations, access security and potential on-line information updating.*

e) *Develop a conceptual framework for this method.*

f) *Prepare detailed functional specifications for the design of a work station software package that will meet the above requirements.*

g) *Analyze the cost feasibility of either purchasing the package off the shelf or developing the package, and recommended best alternative.*

h) *Produce a report detailing the following: Summary of interviews/discussions with managers, analysis of information requirements, sample information reports/formats, summary of hardware distribution by manufacturer, summary of local analysis tools such as spreadsheets, summary of management presentation needs and detailed functional specifications for the design of a work station software package that will meet the above requirements, with an estimate of cost to either purchase or develop the package and a recommendation on the best alternative.*

The modified objectives were redefined as "to determine how well existing computer systems are presently serving DOC management's information needs, to identify any additional information requirements of DOC managers, and to investigate and recommend ways that would allow DOC managers and their support staff better and easier access to computer-based information relevant to their critical success factors."

The modified terms of reference were redefined as follows:

a) Interview a sampling of at least 42 managers chosen from various levels at HQ, three Regional offices, CRC, and CWARC to determine their current information and systems usage.

b) Analyze the results of the interviews conducted and extract the common characteristics.

c) Assess the effectiveness of existing corporate, sector-specific, and other systems available to DOC management in delivering information relevant to their needs.

d) Determine particular information access problems and identify opportunities for improvement.

e) Consolidate and summarize manager's additional information requirements across all organizational units surveyed.

f) Investigate ways to improve and enhance management's ability to obtain managerial-level information relevant to their needs.

g) Present conclusions, opportunities, develop recommendations and a plan of action.

h) Produce a report detailing the following: Summary of interviews/discussions with managers, analysis of information requirements, opportunities and recommendations for improvements and enhancements, and a recommended plan of action.

1.3 Approach and Methodology

The study comprised four phases:

Phase 1 - Fact finding through interviews with managers
Phase 2 - Analysis of findings and assessment of problems and opportunities
Phase 3 - Search for ways to improve and enhance access to information
Phase 4 - Development of recommendations and suggested action plan

The initial plan for Phase 1 of the study required surveying a sampling of a minimum of 42 managers chosen from five Sectors at HQ, three Regional offices, one District office, CRC, and CWARC. During the course of Phase 1, SMAQ requested that they be included in the survey. Four managers from SMAQ participated as a group in a telephone interview.

In total, 48 interviews were conducted. Forty seven interviews were conducted one-on-one with individual managers and, in a few cases, their support staff. SMAQ's group contribution counted as one interview. The results of the survey are, therefore, based on a survey population of 48.

A thirteen point questionnaire was developed and used in face-to-face and telephone interviews. The interviews were conducted over a three week period from February 22 to March 15, 1993.

The interviewees were asked to describe their current information and systems usage, and to identify the types of problems and deficiencies in their areas of operation. This problem definition exercise served to focus attention on the sort of improvements managers would like to see. The objective was to arrive at a comprehensive assessment of management's needs.

A list of interviewees can be found in Appendix A and a copy of the questionnaire is included in Appendix B.

Phase 2 of the study involved an analysis of survey findings to:

- assess the effectiveness of existing corporate, sector-specific, and other systems available to DOC management in delivering information relevant to their needs;
- determine particular information access problems and identify opportunities for improvement;
- consolidate and summarize managers' additional information requirements;

Phase 3 involved an investigation into ways to improve and enhance management's ability to obtain managerial-level information relevant to their needs.

Finally, in Phase 4 opportunities, recommendations, and a suggested plan of action were developed based on an analysis of manager requirements and personal observation. Because all of the recommendations cannot be implemented at the same time, priorities for implementation had to be determined. The criteria involved in evaluating priorities for implementation included the following:

- Capacity to support office functions that would improve the manager's effectiveness and efficiency.
- Capacity to improve and enhance the organizational unit's existing planning and control processes.
- Capacity to improve retrieval, storage and accuracy of information central to operations related to management.

1.4 Overview of Existing Computer Systems

The study identified four principal categories of systems within the Department as a whole. It is important to note that although these systems are required by managers, they are not necessarily directly available to managers. The four principal categories and their constituent systems are:

1. Corporate Systems, as represented by:

- ARCS (Allotment Reporting and Control System)
- NMCS (National Materiel Control System)
- CCS (Correspondence Control System)
- DPMS (Departmental Personnel Management System)

2. Mission-specific Systems, as represented by:

- SMIS (Spectrum Management Information System)
- SMS (Spectrum Management System)
- CIN (Conservation Information Network)

3. Other Systems Available to Management, as represented by:

- SEN (Senior Executive Network)
- E-Mail (Electronic mail systems)

4. Office Systems, as represented by:

- Wordprocessing applications, namely Wordperfect
- Spreadsheet applications, namely Lotus 1-2-3

These systems are discussed briefly in the pages that follow.

The study also identified a fifth category of computer systems. These were all independent, PC-based, stand-alone systems developed in-house by a Sector or Branch to satisfy specific local needs. These systems were built using popular PC software packages such as dBase, Q&A, and Rapidfile.

A Departmental Salary Planning Module (SPM) was recently introduced, and a personnel management system procured from Environment Canada is anticipated in June 1993. The latter will be available to the Department's human resource specialists only.

Corporate Systems:

Allotment Reporting and Control System (ARCS)

ARCS was designed to be the principal departmental financial system to satisfy parliamentary and managerial requirements for financial visibility, accountability and control. ARCS provides sub-systems for Financial Planning, Resource Allocation, Management Planning, Commitment Control, Expenditure Accounting, Revenue Accounting, Financial Reporting, Management Reporting, Financial Administration, and Ministerial Portfolio. ARCS features on-line input, edit, update, access and reporting. The update routine includes funds control, free balance monitoring, outstanding account status (e.g. hard commitments) and update of vendor records.

National Materiel Control System (NMCS)

The NMCS is the major administrative corporate system. It captures information on the Department's assets and provides management information on these assets. NMCS was developed in 1981 and provides for the recording and control of all accountable items, identifying locations, account holders, commodity types, quantity, value, etc.

Correspondence Control System (CCS)

CCS provides for the logging, tracking and reporting on correspondence relating to the offices of the Minister, Deputy Minister, and Assistant Deputy Ministers. It also acts as a bring forward and reminder system for the control of correspondence among these offices. The system in under the control of the Executive Correspondence Unit. There are about 300 transactions applied daily. The CCS operates on a Gould 6040 computer with a secure UNIX operating system.

Departmental Personnel Management System (DPMS)

At present, there is no internal Departmental personnel management information system. The Department uses Supply and Services Canada's DPMS system.

Mission-Specific Systems:

Spectrum Management Information System (SMIS)

SMIS is the system used to collect and report on human resources to the spectrum management and regional operations program. It is a tool to assist managers in planning, allocating and controlling resources with respect to current and projected work loads.

The SMIS system resides on the ARES relational database management system. Users located across Canada have access to the system for data entry and production of output reports.

Spectrum Management System (SMS)

The Spectrum Management System supports the spectrum specific offices in day-to-day operations associated with assignment and licensing workloads. The system is divided into three major sub-systems:

- The Assignment and Licensing sub-system (ALS) which is a database of all frequency assignments and radio licenses in Canada and which records revenue generated from licensing against individual license accounts.
- The electromagnetic compatibility sub-system which provides engineering calculations to pre-determine interference possibilities of a proposed frequency prior to its assignment.
- The spectrum occupancy sub-system which is a minicomputer-controlled radio receiver used to collect statistics regarding radio channel usage, which data is processed and then used in the frequency assignment process.

Conservation Information Network (CIN)

The Conservation Information Network is a joint venture involving the Getty Conservation Institute (GCI), the Canadian Conservation Institute (CCI) and the Canadian Heritage Information Network (CHIN). This venture brings together the resources of the conservation community and enables the Network to offer subscribers comprehensive information relating to the conservation and restoration of all types of cultural property, including sites, architecture, and museum objects. The Network is housed on CHIN's computer system and CHIN provides the technical support for this project. Subscribers in many countries can have access to CIN's databases. Where on-line access is not possible, information on diskettes and hard copy publications are available.

Other Principal Systems:

Senior Executive Network (SEN)

SEN is a network that links senior executives across all Federal Government Departments and provides them with access to information of common interest. SEN users not only have access to information but can also send and receive messages. The SEN software resides in each local workstation, and all reading and composing of messages is done locally at the workstation.

E-Mail

There are a number of E-Mail systems in DOC. These systems are provided by Novell, Banyan, SEN, and TCP/IP software. There is no global connectivity between all of these different E-Mail systems. Currently the Banyan based E-Mail is the most widespread system in DOC available to approximately 80% of DOC employees.

Office Systems:

The Department's office systems technology appears to be based principally on IBM-compatible personal computers and the Microsoft DOS operating system. The majority of the managers interviewed had an IBM-compatible machine in their desk. As at this date, it is estimated that as much as 80% of desktop PCs are 386 or 486 class machines. Apple MACs are in strong use within the research sector of the Department.

The most widely used office systems software packages are Wordperfect and Lotus 1-2-3.

2.0 THE SURVEY

2.1 Background to the Survey

A survey of 51 managers took place between February 22 and March 15, 1993. The survey population was chosen to obtain a representative cross section of managerial information needs. In consultation with DGIM, a total of 65 potential interviewees were identified from which 51 were interviewed.

The survey population was drawn from the following organizational units within DOC:

Organizational Unit	No. of Interviewees
ADMPM (Policy Management)	4
ADMAH (Arts and Heritage)	5
ADMCM (Corporate Management)	7
ADMCP (Corporate Policy)	2
ADMRS (Research and Spectrum)	17
SMAQ (Quebec)	4
CRC (Communications Research Centre)	3
EDC (Prairies and NWT Region)	3
EDO (Ontario Region)	4
EDA (Atlantic Region)	2

With the exception of CWARC, all of the organizational units contributed to the survey. The SMAQ interviewees participated as a group.

A list of interviewees is included in Appendix A.

The objective of the interviews was to gather study facts to develop an understanding of the current situation with regard to managerial information access and to recognize potential opportunities for improvement.

A questionnaire was compiled and pretested on an initial group of five managers in face-to-face discussions in Ottawa and telephone discussions with EDC and EDA. Refinements were then made to the questionnaire and a shortened list of 13 questions was finalized. A sample of the questionnaire as it was used during interviews appears in Appendix B. Responses were later tabulated to facilitate analysis and summarization.

The co-operation and support from the managers surveyed was complete and unreserved. During interviews, managers and staff were frank and open in their questions and responses. Their co-operation and support was greatly appreciated.

2.2 The Questionnaire

The questionnaire was designed to elicit information from managers on the following 12 points:

Nature of information used and computer systems accessed
Manager's degree of dependency on computer systems
Ease of access to information
Timeliness of receipt of information
Clarity and usability of information output
Ability of existing systems to respond to ad-hoc queries
Ability of existing systems to produce regular reports
Level of satisfaction with quality of existing information
Additional information requirements
Current hardware and software environment
Level of satisfaction with current hardware and software environment
Level of comfort with and willingness to use Windows

A thirteenth point took the form of an open-ended question where the interviewee was invited to add any other pertinent remarks and comments in the context of the interview discussions.

These points represent essential criteria for evaluating a manager's total computer and information usage profile.

A sample of the questionnaire as used in the interviews is included in Appendix B.

Tabulation of the interview data was organized under the above headings.

2.3 Summary of Survey Findings

Following each interview, the interview notes were analyzed and tabulated under the 13 headings identified in the previous section.

A total of 51 managers were interviewed. However, as SMAQ's four interviewees participated as one group, the total population surveyed is counted as 48.

Below is a summary of the survey findings. The actual question as asked appears in italics.

Total population surveyed = 48

1. Nature of information used and computer systems accessed

"What is the nature of the information you work with? Is it related to finance? Human resources? Pay? Materiel management? Correspondence Management? Spectrum Management? Other? What computer systems do you use to access this information?"

This was a two-part question intended to determine the nature or type of information that the manager uses on a regular basis in the course of his/her work, and what, if any, existing computer systems provide this information.

a) Nature of Information Used:

Below is a list of broad-based categories of information that managers reported they use regularly in the course of their work regardless of whether it is obtained from a computer system, together with the number of managers who said they use this type of information.

Financial	44
Human resource	36
Salary management	7
Materiel management	15
Ministerial correspondence	10
Planning and budgeting	4
Textual information/reference data	43
Project planning	5
Spectrum management	9

b) Computer systems accessed for this information:

This part of the question essentially asks the manager to identify which existing computer systems provide them with the type of information they cited above. Responses are broken down by computer system and number of managers who have access to that system. Note the number of local systems co-existing in parallel with the official systems. This seems to suggest a low level of confidence in the official systems.

Information	Computer System Accessed	No. of Managers with Access to this System
Financial management:	ARCS	39
	Local systems	29
	Lotus 1-2-3 based	7
Human resource:	DPMS	3
	SMIS	15
	Local systems	20
Salary management:	SPM*	3
	Local systems	4
Materiel management:	NMCS	15
Ministerial correspondence:	CCS	10
Planning and budgeting	ARCS	1
	Local systems	2
	Lotus 1-2-3	1
Textual information/reference data	SEN	26
	E-Mail	43
	CIN	3
	Local systems	7
	Wordperfect	35
Project planning	Local systems	5
Spectrum management	SMS	9

*At time of writing, SPM was available to three interviewees, with more due to receive it later.

A further observation was made regarding who actually accesses the computer system to extract the information required - the manager personally or the manager's support staff on behalf of the manager. This point was very relevant as it provided an indicator to the manager's level of comfort with the available systems.

Computer system	Accessed personally by manager	Accessed by manager's support staff
ARCS	2	37
NMCS	1	14
CCS	2	8
DPMS	-	3
SEN	26	-
E-Mail	43	-
SMIS	-	15
SMS	9	-
CIN	3	-
Wordperfect/Lotus	35/8	-
Local, independent systems (developed in-house or purchased)		
- Financial	-	29
- Human resource	3	17
- Salary management	4	-
- Planning and budgeting	3	-
- Text retrieval	2	5
- Project planning	5	-

2. Manager's degree of dependency on computer systems

"Do you depend on your computer for a large part of your information needs?"

This question was intended to determine just how much the manager depends on the computer systems identified in question 1(b) to provide the information that the manager said he/she uses. The responses given by the manager (or the manager's support person) were categorized as follows:

High:	Depends exclusively on this system for all information needed.
Medium:	Depends on this system for some information. Has access to other sources for needed information.
Low:	Depends on this system for a small proportion of needed information. Relies heavily on other sources to provide information needed.
None:	Has access to this system but does not depend on it at all.
N/A:	Neither manager nor support staff have access to this system.

Computer System	Degree of Dependency is:				
	High	Medium	Low	None	N/A
ARCS	11	3	19	6	9
NMCS	4	2	7	2	33
CCS	3	4	2	1	38
DPMS	-	3	-	-	45
SEN	16	7	2	1	22
E-Mail	35	7	1	-	5
SMIS	4	6	4	1	33
SMS	6	3	-	-	39
CIN	3	-	-	-	45
Wordperfect, Lotus	24	7	3	1	13
Local, independent systems (developed in-house or purchased)	27	2	-	-	19

3. Ease of access to information

"When you use your PC to retrieve information, is it easy to get at the information you need?"

Managers (or support staff on behalf of managers) who commented on their experience with respect to ease of access to these systems. N/A means neither manager nor support staff have access to that system.

	Very Easy No Problems	Moderately Easy Some Problems	Very Difficult Many Problems	N/A
ARCS	-	11	28	9
NMCS	1	14	-	33
CCS	1	9	-	38
DPMS	-	3	-	45
SEN	3	22	1	22
E-Mail	29	13	1	5
SMIS	10	5	-	33
SMS	7	2	-	39
CIN	1	2	-	45
Wordperfect, Lotus	34	1	-	13
Local, independent systems (developed in-house or purchased)	29	-	-	19

4. Timeliness of receipt of information

"Are you getting the information in a timely manner? Do you find you have to spend a lot of time hunting or waiting for the information you need to do your job? When you receive the information you need, is it still relevant and useful to your work?"

Distribution of responses from managers regarding timeliness of information, i.e. the state of availability when pertinent information is needed from these systems. N/A means neither manager nor support staff have access to that system.

	Information always avail. when needed	Some moderate but acceptable delays	Information arrives too late to be of relevance	N/A
ARCS	5	12	22	9
NMCS	2	13	-	33
CCS	1	8	-	39
DPMS	-	3	-	45
SEN	6	19	1	22
E-Mail	32	11	-	5
SMIS	5	10	-	33
SMS	3	6	-	39
CIN	-	3	-	45
Wordperfect, Lotus	35	-	-	13
Local, independent systems (developed in-house or purchased)	26	3	-	19

5. Clarity and usability of information output

"When you receive the information, is it presented in a format that you can easily use? If not, how would you like to see the information presented?"

Managers were asked to comment on how clear and usable are the screen displays and paper reports they get from these systems. N/A means neither manager nor support staff have access to that system.

	Well formatted clear and easy to use	Not well formatted, moderately clear but acceptable	Poorly formatted, unclear and difficult to use	N/A
ARCS	1	12	26	9
NMCS	1	14	-	33
CCS	2	8	-	38
DPMS	-	3	-	45
SEN	4	22	-	22
E-Mail	27	16	-	5
SMIS	6	9	-	33
SMS	4	5	-	39
CIN	-	3	-	45
Wordperfect, Lotus	35	-	-	13
Local, independent systems (developed in-house or purchased)	28	1	-	19

6. Ability of existing systems to respond to ad-hoc queries

"What kind of ad-hoc queries/requests for information are you called upon to answer as part of your work? When and where do these queries originate? How often do you get such queries?"

Ad-hoc queries are the type of queries that managers may want to make or may be called upon to make to satisfy an infrequent or unusual request. For example, how many managers take work home and how much time do they spend working at home per week.

The question was phrased in this way to stimulate thought on the part of the interviewee. The intention was to determine the availability, ease of retrieval and completeness of the information stored within the system.

Managers were asked to rate the ability of these systems to respond to ad-hoc queries. N/A means neither manager nor support staff have access to that system.

	All needed info easily avail. Able to respond quickly with no difficulties	Needed info not easily available. Some time required to respond	Needed info not available. Unable to respond.	N/A
ARCS	2	25	12	9
NMCS	2	12	1	33
CCS	4	6	-	38
DPMS	-	3	-	45
SEN	1	25	-	22
E-Mail	33	10	-	5
SMIS	4	11	-	33
SMS	4	5	-	39
CIN	1	2	-	45
Wordperfect, Lotus	30	5	-	13
Local, independent systems (developed in-house or purchased)	26	3	-	19

7. Ability of existing systems to produce regular reports

"What kinds of regular reports and/or statistics do you have to prepare? For whom? How frequently? Are there any reports that are required from you as part of some regulatory policy or legislation?"

Managers were asked to rate the ability of these systems to produce regular reports. N/A means neither manager nor support staff have access to that system.

	All data available and up-to-date. No delays in producing reports on time.	Needed data slightly late getting into system. Some delays in producing reports on time.	Needed data is consistently very late getting into system. Severe delays producing reports.	N/A
ARCS	2	22	15	9
NMCS	2	12	1	33
CCS	3	7	-	38
DPMS	-	3	-	45
SEN	-	25	1	22
E-Mail	30	13	-	5
SMIS	6	9	-	33
SMS	4	5	-	39
CIN	-	3	-	45
Wordperfect, Lotus	30	5	-	13
Local, independent systems (developed in-house or purchased)	26	3	-	19

With respect to reports required as part of some regulatory policy or legislation, none were required.

8. Level of satisfaction with quality of existing information

"How satisfied are you with regard to the quality of the information you are getting? Is the information always up-to-date, accurate, reliable, complete, and relevant?"

Managers were asked to rank their level of satisfaction with the quality of the information they work with, where quality is defined by accuracy, completeness, reliability, and relevance of the information. N/A means neither manager nor support staff have access to that system.

	Very Satisfied	Somewhat Satisfied	Unsatisfied	N/A
ARCS	2	8	29	9
NMCS	2	3	10	33
CCS	4	6	-	38
DPMS	-	1	2	45
SEN	4	21	1	22
E-Mail	24	19	-	5
SMIS	6	8	1	33
SMS	4	5	-	39
CIN	1	2	-	45
Wordperfect, Lotus	31	4	-	13
Local, independent systems (developed in-house or purchased)	25	4	-	19

9. Additional information requirements (what additional information would enhance effectiveness)

"What information would you like to have but can't get (or get easily) at this time?"

Below is a high-level summary of the main information groupings that managers would like to have access to. A detailed list of manager's information requirements is provided in Section 3, Assessment of Managerial Requirements.

- Personnel management data
- Expenditure management data
- Project planning data
- Procurement data
- Program operations data
- Salary management data
- Staffing data
- Planning and budgeting data
- Training and development data
- Records management data
- Classification data
- Security management data
- Asset management data
- FAA policies guidelines data

10. Current hardware and software environment

"Please provide an inventory of the major items of computer hardware and software that you are presently using."

The purpose of this question was to determine the distribution among interviewees of IBM (or compatible) DOS-based machines and Apple MacIntosh machines as well as availability of Windows and links to the Banyan local area network:

386/486 IBM or compatible DOS-based microcomputers = 47

Apple Macintosh machines = 2

Number of managers linked to Banyan LAN = 37

Number of managers who have Windows installed = 28

One interviewee had both an IBM and MacIntosh computer on his desk.

It is important to note that there is a significant number of MacIntosh computers at CRC and CWARC as well as IBM-compatibles, with some managers having access to both.

11. Level of satisfaction with current hardware and software environment

"How satisfied are you with the performance your hardware and software in enabling you to carry out your work?"

Managers only (and not their staff) were asked to rate their satisfaction level with their existing microcomputer hardware and software:

Very Satisfied	33
Somewhat satisfied	12
Unsatisfied	3

12. Level of comfort with and willingness to use Windows

"Do you use a graphical user interface such as Windows? Do you feel comfortable working with a GUI? Would you like to use a GUI such as Windows and Windows-based software?"

This question was asked to guage manager's receptiveness to Windows as a representative of a graphical user interface (GUI) product. This question is pertinent in that an increasing number of software products aimed at management are GUI based.

Comfortable with and willing to use a GUI	35
Some doubts as to its usefulness, but willing to try it	10
Would prefer not to use a GUI	3

It should be noted that 28 of the 35 managers above who said they are comfortable with and willing to use a GUI already have Microsoft Windows. The remaining seven managers did not have a GUI but are receptive to the idea of using one.

13. Other pertinent remarks and comments provided by interviewee

"Within the context of our discussion, are there any other remarks or comments you would like to add at this time?"

Interviewees were invited to make any additional comments in the context of the discussion. This question provided managers and, in some cases, their support staff with a platform to express their thoughts and opinions on matters related to the computer and information environment with which they work.

A number of common themes emerged, and only a sampling of the most significant comments, grouped under these common themes, is provided below. The comments provided were frank and unreserved, and are quoted verbatim.

On Corporate systems in general

> I prefer not to use the corporate systems, they are generally too cumbersome, but in some instances I'm obliged to use them.
>
> The corporate systems need a lot of improvement.
>
> I can't say that I can really manage well with the corporate systems.
>
> If the [corporate] systems were easy to use and if the information I want was easily available then I might use the computer and systems more effectively.

On the ARCS system

> It gives you no sense of control over what you are doing.
>
> I have no confidence in ARCS data.
>
> The reports from ARCS are not always useful to my needs.
>
> There is no verification mechanism.
>
> Trivial requests for information are difficult to satisfy.
>
> ARCS is not user-friendly, it is cumbersome and frustrating to use.
>
> I have difficulty navigating through ARCS and I get lost easily.
>
> I cannot rely on ARCS for my essential reporting needs.
>
> I cannot easily get summary information out of the system.

I need more control over input into ARCS.

We do not depend on ARCS for anything. We have our own systems.

I have to do a lot of reconciliation with my own figures.

I always have problems with hard and soft commitments.

It takes so long to have an expenditure decommitted.

ARCS data is usually one to four weeks out of date.

My staff needs more training on ARCS. I think at least two weeks of ARCS training should be a must for all staff.

I have to reformat the data using Lotus 1-2-3.

ARCS probably has all the information needed and is probably trustworthy but accessing that information is difficult.

On the SEN system

I depend on SEN but it is not easy for me to use.

SEN is slow. It seems to take hours to send and receive data. I can not use is as a rapid information/communication transmitter.

I use SEN on a daily basis but it is cumbersome for me to use. It is slow to log on and slow to retrieve. It doesn't allow me to quickly and easily jump back and forth among its applications.

SEN is not good from an Apple MacIntosh perspective.

I would like to see messages from SEN come into E-Mail and vice-versa.

On human resource information

I have to use the DSS system but it doesn't give me everything I need.

Right now I have no idea who has completed what training courses.

My duties require that I handle a lot of personnel type issues. All of my information is in paper files which I do not have quick and easy access to.

I have no easy way of tracking salaries. Its currently a paper exercise and it takes hours to collect the information I want.

I need to have data on who does what and at what levels.

I eventually will have to do some succession planning in my Branch but I have no ready figures to work with.

On organizational planning and control

As a manager, I spend a lot of my time deciding how to allocate resources and manage expenditures. I need more timely and better quality information to help me in this process.

I need to maintain a global perspective on my Branch's operations but I don't have easy access to the kind of data that will help me do this well.

I have no quick way of checking if I'm on track with a project. It can take a whole morning to find out.

On the perception of DGIM

I have very little confidence in DGIM's ability to deliver.

I sometimes feel there is a lack of direction from DGIM on informatics matters.

DGIM appears to have very little authority in this [informatics services] area. They should show more leadership.

2.4 Analysis of Survey Findings

Analysis of the survey findings produced the following results. The results are presented in the order of the questionnaire items.

Nature of information used:

- Of the nine major categories of information that managers reported they use in the course of their work, there are three categories that managers use significantly more than any other: financial management information (92%), general text based information (90%) mainly in the form of electronic documents created and retrieved, and human resource information (75%). These three categories are sources of core management information. The usage pattern for these three categories is fairly consistent with other government departments. The other major information categories are materiel management, ministerial correspondence, spectrum management, salary management, project planning, and planning and budgeting.

Computer systems accessed:

- The computer systems that provide managers with the management information they need in the core areas of financial management and personnel management are locally developed PC-based standalone systems created with dBase, Q&A, and Lotus 1-2-3. As far as personnel information is concerned, the existence of locally developed PC-based applications is understandable as there exists no full featured departmental human resource information system. The DPMS system provided by DSS is limited in functionality and availability. On the other hand, although the departmental financial system ARCS is the official system for financial management and available to 81% of interviewees, in several branches and directorates surveyed it is supplemented by locally developed applications.

- Seventy seven percent of the managers interviewed stated that although the systems may be available to them, they did not access those systems personally but relied on their support staff to extract and present the information they needed. This is especially true of the corporate systems.

- Of the computer applications used personally by managers, E-Mail is the most frequently accessed followed by SEN and Wordperfect.

Degree of dependency on computer systems:

- The profile of managerial dependency on existing systems to supply their information needs revealed a dependency level of low with respect to available corporate systems such as ARCS, NMCS and DPMS, and generally high on other available systems such as SEN, E-Mail, and local systems.

- Almost all managers said they rely heavily on E-mail but some are having problems with E-mail attachments.

Ease of access to information:

- All managers expressed varying degrees of frustration with the corporate systems with regard to ease of access and did not feel they were in control of these systems.

- The departmental financial system ARCS presented the greatest number of problems for all users. ARCS problems, however, appear to be generally confined to HQ. This is probably due to the fact that there are no standard procedures governing the input of data into ARCS. Two Regions interviewed did not express the same degree of frustration with ARCS, possibly because they have more control over what goes into ARCS.

- While the Senior Executive Network (SEN) system appears to be running reasonably well, there is room for improvement in several areas including its current user interface and general performance.

Timeliness of receipt of information:

- For information to be useful, it must be timely. The required information must be available within a time span in which it is still relevant and usable. Most interviewees said there were some delays in getting information from almost all the available systems, but that these delays were in most cases acceptable. The exception was ARCS where, because of its inherent difficulties, serious delays were frequently encountered. This situation reinforces the manager's dependence on local systems.

- It is important to note that while some managers reported that they get their information on time, this was because the managers themselves do not personally access and manipulate the information needed. They rely heavily on support staff to provide them with the information they need. The support staff, on the other hand, had a different opinion on ease of use and timeliness of information.

- Most interviewees stated that systems that were not under their direct control were the least timely. In this context, almost all systems were judged as not very timely with the exception of E-Mail and office systems in general (i.e. Wordperfect, Lotus, etc.).

Clarity and usability of information output:

- To be clear and usable, the information that is output by a computer system, whether on-screen or on paper must be presented in a format that makes it easy to assimilate and comprehend. The outputs from most of the systems available to the interviewees were reported to be moderately clear but acceptable. Forty six percent of interviewees said that the output from SEN needed some improvement. The exceptions were, at one extreme, the ARCS system where 54% of interviewees said that the output was poorly formatted, unclear, and difficult to use. At the other extreme, the majority of interviewees said they were satisfied with the format of the output from E-Mail, Wordperfect, Lotus 1-2-3, and locally developed systems in general.

- For the occasional user, reading ARCS reports is difficult. For the experienced "hands-on" user ARCS is not so much of a problem.

Ability of existing systems to respond to ad-hoc queries:

- Ad-hoc queries are the type of queries that managers may want to make or may be called upon to make to satisfy an infrequent or unusual request. For example, how many managers take work home and how much time do they spend working at home per week. The ability of computer systems to respond readily to questions of this nature attests to the availability and completeness of the information stored within the system. The majority of interviewees said that it took some time to obtain a response to an ad-hoc query from most systems because they did not know the full extent of the information available on the systems.

Ability of existing systems to produce regular reports:

- Most administrative applications are designed to produce reports periodically. The usefulness of these reports depends on the relevant data getting into the system in a timely fashion. Most interviewees reported that the data they need is generally late getting into the administrative systems and hence some delays in producing reports were occurring. Thirty one percent said they experienced severe delays with the ARCS system. Local systems and systems that are under their direct control had the least problems.

Level of satisfaction with quality of existing information:

- Quality information is defined as information that is up-to-date, accurate, reliable, complete, and relevant. Managers' level of satisfaction tended to range from very satisfied to somewhat satisfied for all systems except ARCS. Sixty percent of interviewees said they were not satisfied with the quality of information from ARCS. The most frequent reason given for this lack of satisfaction was the question of timeliness in getting the data into the system. There are frequent and significant variances in data reported by ARCS and data held by managers.

Additional information requirements:

- A list of major data elements that managers said they can't get, or get easily, is provided in Section 3 of this report.
- All managers interviewed expressed a pressing need for human resource information. A corporate HRIS does not at present exist. A system is being purchased from Environment Canada to be installed in June 1993.
- A significant number of Branches/Directorates have developed their own local, independent systems using dBase, Q&A, Reflex, PC/Focus, Golden Retriever, and other popular PC packages, to meet unsatisfied data needs or to circumvent reliance on the corporate systems.
- There is a proliferation of the "Free Balance" software package because it is perceived to be easier to use and to provide more reliable data and more control than ARCS.
- Managers want analytical tools to do "what if" type analysis and to spot trends.
- Managers want improved support for management planning (the process by which goals are established), and control and performance monitoring (the process by which data is collected and evaluated to ensure that the goals are on track).
- Managers want data presented in more meaningful formats.
- Some managers want off-hours and off-site data access (i.e from home or while travelling).
- Managers want access to more external databases. These databases mainly provide text-based reference data on current issues and affairs in special areas of interest.
- Managers want the ability to combine data from multiple sources and to be able to "cut and paste" information from different sources.
- Managers want enhancement of personal communication links to enable them to stay on top of critical activities in the Department.

Current hardware and software environment:

- The majority of PCs on manager's desks were IBM compatible DOS-based computers.
- It was observed that hands-on time spent using their computer varied among managers from zero to four hours per day.

Level of satisfaction with hardware and software environment:

- Approximately 68% of respondents said they were very satisfied with their existing microcomputer hardware and software. Twenty five percent said they were somewhat satisfied while approximately 7% said they were unsatisfied.

Level of comfort with and willingness to use a graphical user interface such as Windows:

- Approximately 73% of respondents said they already have a GUI (Microsoft Windows in all cases) and were comfortable with and willing to use a GUI such as Windows. Approximately 20% said they had some doubts as to its usefulness but were willing to try it, while approximately 7% said they would prefer not to use a GUI.

Miscellaneous remarks and comments provided by interviewees:

- Analysis of responses to the question inviting interviewees to provide their thoughts and opinions on their computer and information environment produced much significant information. It was recognized that this may be the first time managers were afforded the opportunity to express their views on this matter. A number of major themes surfaced as interviewees voiced their opinions and concerns. The major themes are related to:
    - Corporate systems in general
    - The ARCS system
    - The SEN system
    - Human resource information
    - Organizational planning and control
    - Perception of DGIM
- The majority of interviewees felt that the principal corporate systems, namely ARCS, NMCS and DPMS that are intended to provide core management information were not easy to use and were not serving them well.

- The ARCS Departmental financial system drew the greatest number of remarks. Virtually all the remarks were negative. It is important to note that these remarks were made principally by managers and support staff at HQ. Some managers in the Regional offices surveyed did not share these views. The assumption is that Regional offices are closer to ARCS in that they have direct control of the processes and procedures involved including input to the system.

- The principal comment with regard to SEN was related to speed, although its operation, user interface, and general performance were also remarked upon.

- There appears to be a diverse and non-integrated collection of manual and mechanized systems currently servicing the personnel function. The DPMS system provided by DSS is limited in scope and availability.

- Some managers whose primary activities involve setting objectives, allocating, and monitoring resources (people, money, etc.) said they did not have adequate, reliable support systems to help them evaluate their progress.

- Some managers remarked on their perception of DGIM with respect to its capabilities, credibility, and general image, all of which are perceived as less than satisfactory. These remarks could not be ignored as the recommendations being made in this document demand a prominent role for DGIM, as a provider of corporate informatics services and systems, in carrying out these recommendations.

3.0 ASSESSMENT OF MANAGERIAL REQUIREMENTS

This section presents a consolidation and summary of the survey's findings with respect to management's additional information and reporting requirements.

As part of the survey, managers and in some cases, their support staff, were asked to identify what improvements and enhancements to their existing systems they would like to see in terms of additional information and reporting capabilities. The objective was to arrive at a comprehensive assessment of DOC management's information needs.

Given the types of problems and deficiencies in the areas reported in Section 2 of this document, this Section attempts to articulate management's requirements for desired improvements to existing systems and information access.

Managers were asked to evaluate their requirements using the following guidelines:

- Are your current systems contributing to meeting program objectives?
- Is access to needed data too cumbersome?
- Are searching, retrieval, analysis, and reporting methods satisfactory?
- Is essential information missing, insufficient or questionable?
- Is the time and effort spent in obtaining information from the computer disproportionately high relative to the benefit/usefulness derived from it?
- Is data being duplicated on parallel systems?

In reviewing manager requirements, the following considerations were applied:

- Can current methods be changed to eliminate any steps?
- Would a change in manual procedures help improve the system?
- Can the existing system easily be improved/enhanced and at reasonable cost?
- Would some sort of computerized management support system be of benefit, and is the benefit cost-justifiable?

In the sections below, a consolidation and summary of statements of need made by the interviewees is presented.

3.1 General Requirements

The recurring theme repeated by the majority of interviewees relates to the problems posed by insufficient capability to analyze existing data and to respond quickly to information demands. The need to maintain a global perspective on operations is especially relevant to management for planning and decision support purposes. While the necessary data is often available in various systems, the production of useful information for purposeful action is not always available.

An analysis and ranking of interviewee responses with regard to general requirements revealed the following profile. The requirements are listed in rank order.

Need for timely information
Need for more accurate information
Need for rapid status updates on different business areas
Need to be able to identify historical trends
Need for access to operational data
Need for improved communication
Need to be able to respond to a rapidly changing external environment
Need to be more proactive in dealing with external environment
Need to access external databases
Need for increased effectiveness
Need for increased efficiency

The survey findings revealed that respondents consider the need for timely information to be most critical. This is followed by the need for more accurate information. This seems to confirm that managers do not consider certain current sources of their information to be accurate.

3.2 Information Requirements

The following is a list of information items that interviewees provided in response to the survey question "What information would you like to have but can't get (or get easily) at this time?" The reader will note that the greatest concentration of information requirements have to do with personnel type information. This was expected as, at time of writing, there exists no departmental personnel information system that can provide all this information.

Financial Information:

Budget expenditure data - free balance, forecast, six month and year-to-date expenditures.
Roll-up information - where are the different units in terms of expenditures.
Monthly cost of telephone bills (at CCI).
Loans and grants processing.
Status of outstanding transactions.
Salary expenditures.
Initiate expenditures and approve payments, decommit items.
Overdue account data.
Spending limit checks in accordance with Financial Administrative Act policies and guidelines.
Revenue data.
Reconciliation between ARCS and other systems, for example initial commitment and actual expenditure may not be the same and need to be reconciled.
Project tracking data - time, money, people, resources.

Personnel Information:

Classification data, position points, position histories.
Job descriptions.
Staffing data - priority lists, candidate inventories.
Security clearance data.
Reminder of upcoming completion of six-month probation period.
Employee awards.
Volunteer events and staff involved.
Number of corporate activities per year - personnel involved in United Way Campaign.
Health and safety data - number of accidents per year with supporting details.
Training and development data - course history information, departmental training data integrated with position requirements and employee career plans, course catalogues.
Travel data - tracking employee travel, travel history, travel schedules, fares, travel regulations.
Conference scheduling, attendance, attendance planning, history.
Employee appraisals and performance data.
Staff relations data - grievance, exclusions, conflicts of interest.
Benefits data - access to personal benefits, catalogue of benefits offered and their cost.
Salary and compensation data - increments, acting pay, promotions, overtime, salary history.
Human resource planning - information for statistical analysis such as age, profile, turnover, education, etc.
Special programs data - monitor Target Executive Count, student programs.
Human resource utilization data.

Official languages data - linguistic profile, incumbent profile.
Employment equity data.
Career management data.
Attendance data - vacation, leave of absence, absenteeism, sick leave, etc.
Access to position opening, electronically post and search on qualifications.
Organization charts - instant and automatic generation.
Employee profile data.
Succession planning.

Materiel Management Information:

Procurement - tracking the ordering of supplies.
Inventory control, reconciliation, management and disposal.
Vendor list and standing offers.
Building heating costs (for CCI).

Planning and "What If" Analysis

Government/Departmental priorities considerations.
Multiple version scenario development.
Implementation of final/approved scenario.
Multi-Year Operational Plan (MYOP) processing.
Personal, shareable, time management/scheduling/priorities planner.

Document Management/Tracking and Textual Information:

Access to departmental records management/information holdings system.
Access to Information and Privacy (ATIP) data.
Management of electronic forms.
Management of electronic messages.
On-line access to manuals on policies, guidelines, directives, standards, collective agreements. For example: personnel policies, administrative policies, financial management policies, official language policies, access to information and privacy policies and guidelines, etc.
Internal and Government electronic phone book.
Minister's agenda.
Briefing notes.
Access to DOC library catalogue.
Updates on status of various DOC initiatives.
Media analyses.
Press clippings.
Press releases.
Information on non-broadcast data.
Use bar codes on Ministerial correspondence to improve the flow and tracking of correspondence through various levels.

Access to Information in External Databases

Access to Council of the Arts database.
Census data from Statistics Canada databases.
Access to data from the Canadian Broadcasting Corporation's databases.
Access to Telefilm database.

3.3 Reporting Requirements

Automatic fiscal year-end and month-end reporting and analysis.
Schedules of Cabinet committee meetings.
Weekly workplan priorities.
Accident-related reports.
ATIP reports.

4.0 CONCLUSIONS, OPPORTUNITIES AND RECOMMENDATIONS

4.1 Conclusions

DOC's source of information and data storage is in the diverse base of installed functional systems applications. However, this large installed base of computer systems is a patchwork of different processes, dissimilar data, different technologies and partial solutions which cannot readily be interconnected. There exists no computerized departmental personnel information system. Personnel information is largely paper-based. An integrated personnel management system is crucial and must interface smoothly with the department's financial system and other, external, systems. A personnel information system has been procured from Environment Canada and will be operational in June 1993.

It emerged that existing systems are deficient in two areas: serving the program managers, and meeting strategic information needs. Departmental resource management systems such as ARCS and NMCS exist as separate entities with little cross-functional integration. The implementation of ARCS has not necessarily reduced work for those who have to use it. The principal challenges facing ARCS usage at HQ are a lack of user-friendliness and some performance problems. The corporate systems are perceived as not having been developed with the manager as a key client. As a consequence, one of management's major functions of leading people and managing resources is constrained.

Managers want to access, at their desk tops, the type of information which they already provide to functional staff or systems in initiating transactions such as hiring staff or purchasing goods and services. Under the single operating budget concept, they need up-to-date resource management information in order to plan, allocate, and control basic input resources (people, dollars, capital, property) for the delivery of government programs. To achieve this, it is necessary to integrate information currently held in the separate systems within the department. The capabilities of today's PC's and co-operative processing technology, coupled with advances in information management make the integration of resource information at the manager's desk not only feasible, but a necessary goal. In support of this direction, a number of today's common systems developments such as management user interfaces have the goal of allowing managers access to a single repository or data warehouse.

Management in today's technology environment depends heavily on electronic forms of communication, and DOC is no exception as evidenced by the survey. Management have come to depend heavily on the Banyan E-Mail network and the Senior Executive Network as a means of rapid communication. However, there are major issues confronting the Department in the overall network area. While the Banyan LAN technology was chosen as the local network for corporate applications, there exists other LAN technologies, namely Novell and TCP/IP. Lack of interconnection and interoperability between these local networks have led to two basic issues which must be resolved: fragmentation of local networks is inhibiting centralized network management, and sharing of information will continue to be inhibited by the lack of interconnection of local networks and the national network.

It is apparent that effective use of automation in corporate applications has received insufficient attention. New initiatives are urgently required to address weaknesses which have led to a proliferation of local, independent applications in many Sectors, duplicated processes, and widespread dissatisfaction with existing corporate applications, especially ARCS in HQ. It should be noted, however, that in comparison with Regional offices, ARCS problems appear to be largely confined to HQ. Regional offices report having greater control over the procedures involved with ARCS. This seems to indicate that perhaps ARCS procedures at HQ should be reexamined.

The new initiatives should include a reassessment of corporate systems architecture, processes and procedures. Critical to the success of any initiatives is a firm understanding of the information requirements of the Department. In response to the information needs expressed by management in the course of this study, extensive information analysis must be carried out within DOC.

Given the above factors, there is a compelling business case for introducing information management resource principles and for initiating the development of an information system to integrate resource management information in support of managerial needs. Given the commonality of resource management requirements across all Sectors, such a system has the potential to be applied throughout all organizational units within DOC.

4.2 Opportunities

Opportunity No. 1 - Implementation of an information resource management framework.

Information resource management (IRM) is concerned with defining, structuring and promoting the management of information as a corporate resource. IRM is defined as the management of an organization's information resources, including both information holdings and information handling functions. Information holdings include information content as well as the media on which the information resides, be it electronic or paper. Information handling functions include:

- data processing
- telecommunications
- office automation/office systems
- paperwork/records management
- library/reference/technical information management

As the technologies on which these various functions rely continue to converge, the Department has to rethink its overall management strategy for information technology and resources. An alternative to the fragmented approach to information management that has heretofore existed is the IRM concept. At the centre of the IRM concept is the concern that some order must be established in the use of new technologies. Simultaneously, IRM represents the recognition among senior management that information management is both an operational necessity and an integral part of the organization's strategic planning process.

Information management principles specify that:

- information is an organizational resource, a costly and valued asset that must be shared;
- responsibility for the management of information resources and technology must rest with a central authority;
- business planning and information resource planning must be closely linked; and
- maximizing the quality, use, and value of information in the organization is a strategic objective.

There are three phases to IRM implementation, usually requiring a two to three year timeframe.

Phase 1: Recognition of the need to manage information as a resource.

This usually stems from the realization that the information resources of the organization are not under control (i.e. information is difficult to access, resides on many localized systems, is duplicated, etc.), and results in the development of high level corporate policies to deal with the problem.

Phase 2: Establishing the foundations for IRM.

Specific areas usually need to be addressed, following from the policies developed during Phase 1. Typically:

- change in the corporate planning approach, to integrate business planning with information systems planning;
- application of resource management principles to information (assessing the cost and value, and establishing accountability for information resources);
- increased development of end user support tools in using information technology, such that users can begin to use information readily in the conduct of their work; and
- establishment of basic procedures for the management of information (including the definition of the role of a central authority as the administrator of information responsible for the delivery of information sources and tools).

Phase 3: Refinement and integration.

This phase involves building on the foundations established in phase 2 to begin to maximize the use of information by all levels of staff in the performance of their jobs. The management, policy and procedural infrastructures established in phase 2 are refined. End user systems such as management support systems are implemented widely throughout the Department.

The Government of Canada has decided that all government departments shall manage their information holdings as a resource. In response, Treasury Board has issued a policy statement on the management of information holdings. Most government departments are now attempting to implement this policy.

Opportunity No. 2 - Implementation of a manager's information resource system.

Managers must cope with multiple issues in an unstructured, complex and changing environment. The manager's remoteness from day-to-day operations of his/her organizational unit creates a need for effective systems to monitor performance in many critical business areas. Their focus is more strategic, dealing with planning and analysis activities that are less well-defined, with longer time horizons, less structure, and often involving conflicting measures of performance. Therefore, their information needs are more qualitative and subjective and require a lot of external data on regulatory, political, and social factors.

A review of the survey findings from Section 2 and a reassessment of management's additional information requirements from Section 3 suggests a need for tools that would provide managers with the ability to enhance their effectiveness in three key areas:

- Performance Monitoring. Managers need more timely, well-organized and accessible information that allows them to track the status of their projects and program goals.
- Query and Analysis. Managers need tools that allow them to perform random and unstructured analysis of data using information provided by corporate and divisional databases.
- Organizational Planning and Control. Managers need information that supports their planning, forecasting, and goal-setting needs and tools that allow them to measure how effectively and efficiently resources are being used in the accomplishment of their objectives.

This suggests a need for some sort of management support system or managers' information resource system. The broad specifications for such a system are:

- ability to extract, filter, summarize, and track critical data;
- ability to provide online status access, trend analysis, exception reporting, and "drill-down" (drill-down allows the user to access supporting detail or data that underlie summarized data);
- ability to access and integrate a broad range of internal and external data;
- capable of being used with minimal or no training or documentation;
- capable of being used directly by executives without intermediaries
- able to present graphical, tabular and textual information;

- able to support electronic communications (e.g., e-mail, computer conferencing, and word processing);
- capable of providing data analysis capabilities (e.g., spreadsheets, query languages and "what if" type analysis);
- able to provide organizing tools (e.g., electronic calendars, automated rolodex, and reminder files);

4.3 Recommendations

In organizations that are information intensive, such as government, information is a strategic resource. Information is the lifeblood of administrative and service delivery functions. The recommendations enumerated below, therefore, emphasize the use and value of information in enhancing individual and organizational productivity and on finding ways of assisting managers in maximizing the use of information in their jobs.

The essence of these recommendations focus on:

- Improving the use of the Department's existing information resources.
- Developing plans for upgrading existing systems or implementing new systems where appropriate.
- Improving the delivery of informatics services and systems.
- Enhancing the confidence managers have in the relevance, accuracy, and timeliness of the information resources they require for decision making and problem solving.

Recommendation No.1

It is recommended that DGIM's role as a provider and manager of informatics services and systems be reexamined be with a view to reorganizing and expanding its mandate to include wider powers and control over the deployment of technology in the Department.

Recommendation No.2

It is recommended that DOC conduct an analysis of its current data structures (major data groupings and component data elements) with the view of providing a detailed inventory of data elements. This inventory of data elements will serve to provide a focus for co-ordinating development of new and enhancement of existing systems.

Recommendation No.3

It is recommended that the processes and procedures associated with the ARCS system be examined with regard to practicality and efficiency. It is also recommended that the ARCS system be reviewed and reassessed with the objective of improving data access, usability, timeliness of data entry, and user-friendliness.

Recommendation No.4

It is recommended that DOC assess the technical and functional features of the departmental E-Mail and SEN with regard to improving performance and functionality.

Recommendation No.5

It is recommended that DOC endorse the development of a managers' information resource system as a common application to provide managers with better transaction and decision-making information. This recommendation is contingent on the necessary managerial information requirements being available.

5.0 SUGGESTED PLAN OF ACTION

It is suggested that the implementation of the above recommendations proceed as follows:

1. Redefinition of DGIM's role, responsibilities and authority.

Estimated time to complete: 6 - 8 months

The importance of the information processing function within DOC will increase substantially as the effort is made to meet the demand for information, as evidenced by the managerial requirements for information discussed in Section 3, and as the demand for information continues to increase in response to the growing capabilities of the new and emerging information technologies. Managing the growth in demand for information, and the advances in the tools for handling information, will require a significant increase in the level of coordination and in the level of resources devoted to the informatics systems and services function.

As the technologies on which the services of data processing, office systems and telecommunications rely continue to converge, there must occur a reassessment in overall management strategy for information technology and resources.

The study has revealed the existence of several locally developed, stand-alone systems that parallel certain corporate systems in functionality. This has resulted in a situation in which responsibilities for information resources and tools are functionally separate and fragmented. The proliferation of parallel systems appears to indicate that coordination with DGIM and DGIM's authority are circumscribed.

It is recommended that the existing information management framework be reviewed with a view to bringing together under a single organizational unit the management and technical expertise residing in subunits within the various Sectors. This unit will include DGIM and may retain that title or adopt a new title such as Informatics Services. The creation of a single organizational unit responds to the need for an integrated approach to the proliferation and rising costs of information technology. This recommendation is in line with a broad movement in other government departments to give informatics services a greater prominence in organizational structure. One rationale for such a change is that information is a resource comparable in importance to the human and financial resources of organizations, and that expertise on information and related technologies should therefore be available within a single unit.

With respect to its status in the Department, this new unit could be a separate Sector or a Branch within corporate management (ADMCM). Regardless of the reporting relationship adopted, the objective of this new unit should be to take a leadership role in defining user requirements and introducing new technology to meet these requirements. Its responsibilities should include the following:

- identification and categorization of all information systems requirements;
- definition of projects and preparation of business case submissions in collaboration with end users;
- development and updating of long-range and annual systems plans;
- management of all systems development for centralized systems;
- provision of guidelines for decentralized development and monitoring of implementation of local systems on micro-computers;
- management of hardware and software procurement including all office automation, communications and microcomputer equipment.

2. <u>Perform data analysis and compile detailed inventory of data groupings and data elements.</u>

Estimated time to complete: 2 to 4 months

Discussions with managers and their support staff revealed many concerns regarding information. In summary, the survey has shown that certain information is currently inaccessible, duplicated, difficult to manipulate, incomplete, and/or in existence but not known to those concerned. This situation results in diminished management control. Management control is increasingly seen to depend on quality information. This implies information that is accessible, easy to manipulate, complete, and reliable. Improved information management is critical to the internal management of DOC.

To improve the quality of information that the Department requires to both deliver services and administer its internal affairs, there must be a major emphasis on the use and value of information in enhancing individual and organizational productivity. The major concern is in finding ways of assisting Departmental personnel in maximizing the use of information in their jobs.

In order to maximize the use of information, one must know what information is available and what additional information is required. Fundamental to the development of new systems and the enhancement of existing systems is a requirement for a comprehensive inventory of data groups and their constituent data elements.

3. **Reexamine the processes and procedures associated with ARCS, and if necessary, carry out a re-engineering of the system.**

Estimated time to complete: 2 - 4 months

The survey has left no doubt that ARCS urgently requires an investigation into its processes, procedures, and functions. As the official departmental financial system it appears to be performing at a much less than satisfactory level. Some users believe it is the processes and procedures associated with ARCS that account for its difficulties, while a significant majority, especially at HQ, believe that the problem is much more than that, and nothing less than a complete overhaul of the system is required.

4. **Enhance the departmental E-Mail system including SEN**

Estimated time to complete: 1 - 2 months

The extensive use of and dependency on E-Mail and the Senior Executive Network (SEN) among the majority of DOC managers highlights the importance of these two communication tools. The main problems with SEN appear to be related to performance and functionality. Some survey respondents reported that speed of operation is less than optimal, the user interface "look and feel" is outmoded, and switching between applications is cumbersome and inefficient.

The principal problem with E-Mail appears to be with attachments to E-Mail messages. Several respondents reported having difficulties accessing E-Mail attachments.

Other issues associated with E-Mail include lack of interconnection and interoperability between three network systems: Banyan, Novell, and TCP/IP. Sharing of information is inhibited by the lack of interconnection among these networks.

5. **Implement a management information resource system.**

Estimated time to complete: 2 - 4 months

In the past few years there has occurred a gradual shift in government and business from managing the physical resources of information to managing the content of information. This shift has been enhanced by new products that the information processing industry is making available to incorporate management support systems and decision support systems software into the workstations and networks that organizations are increasingly coming to rely on. The first wave of such products has already entered the information processing marketplace in the form of electronic

spreadsheets, executive planning tools, and management information resource systems aimed at facilitating both structured and unstructured problem solving, and at enhancing the integration of the organization's internal and external sources of information.

These new systems focus more on supporting the actual use of information for analysis, decision-making, and planning. They have the capability to convert the mass of available data into actionable information. Access to the data through the use of relational database management systems (such as the recently purchased Oracle package) and well designed iconographic menus enable managers to home in on the desired level of data. Extensive use of graphics and colour contribute to easy data manipulation. Trends can be seen in seconds allowing managers to extrapolate and explore trends to determine when to intervene. Managers are able to use such systems with little or no prior training.

The basic functional specifications for a workstation-based management information resource system is included in Appendix C, and a preliminary survey of available systems is included in Appendix D.

It is important to note that recommendations 1 to 4 may be initiated at any time as none is dependent on the other. However, recommendation 5 cannot be implemented until recommendations 2 and 3 are completed. This is because the data that the management information resource system will access is predicated on ARCS and other systems supplying accurate and timely data.

APPENDIX A

List of Interviewees

APPENDIX A

List of Interviewees

DOC SECTORS

ADMPM (POLICY MANAGEMENT)

Esme Bhasin	Chief	Executive Correspondence Secretariat
Francine Chabot-Plante	Director General	Corporate Review
Ninon Charlebois	Director	Planning, Liaison and Public Affairs
Yazmine Laroche	A/Director	Priority Planning and Government Business

ADMAH (ARTS AND HERITAGE)

Peter Homulos	Director General	Canadian Heritage Information Network
Gail Eagen	Director	System Development, CHIN
Ray Rattray	Director	Administration and Finance, CHIN
Gaston Blais	Director General	Arts and Policy Planning

ADMCM (CORPORATE MANAGEMENT)

Daniel Giasson	A/Director	Management and Coordination
Ed Joly	A/Director	Security and Communication
Patrick Borbey	Director General	Financial Management
Joe Larocque	Director	Single Operating Budget
Francine Gallo	Director	Human Resource Planning and Development
Wendy Bergeron	Director General	Administrative and Technical Services
Colin Taylor	A/Director	Facilities Management and Planning

ADMCP (CORPORATE POLICY)

Susan Baldwin	A/Director General	Telematics and New Media
Susan M. Scotti	Director General	Broadcasting

ADMRS (RESEARCH AND SPECTRUM)

Michael Binder	ADM	Research and Spectrum
Andy Kwan	Manager	Systems Interconnection Research
David Mulcaster	Director General	Communications Development and Planning
Ronald Begley	Director General	Broadcasting Regulation
Ralph Zeitoun	Director	Broadcast Planning and Technical Policy
Robert Jones	Director General	Radio Regulatory Branch
Mary Sarsfield	Admin. Officer	Radio Regulatory Branch
Maurice Nunas	Director	Spectrum Management Operations
Nisar Ahmed	Director General	Engineering Programs
Dr. Robert McCaughern	Deputy Director	GeneralEngineering
Thomas Racine	Director	Automated Spectrum Management Systems
Lyn Elliot Sherwood	Director General	Informatics Management
Gilles Rouleau	Director General	Regional Operations
William Dormer	A/Director	Applications Engineering
Royce Trenholm	Manager	Planning and New Technologies
Ken Holt	Director	Certification and Engineering Bureau
Jean-Marc Paquet	Manager	Broadcast Informatics

SMAQ (QUEBEC)

Diane Belanger	Directrice	Coordination de secteur et services de gestion
Alain Robillard	Directeur	Developpement technologique
Paula Fini	Directrice	Personnel
Michel Bourdon	Chef	Services informatiques

Note: The SMAQ participants were interviewed as a group, and are considered as one interviewee in the survey population sampling.

DOC REGIONAL OFFICES

EDC (PRAIRIES AND NORTHWEST TERRITORIES REGION)

Howard Smith	Special Advisor to the Executive Director	
Marcia McKay	Director	Regional Management Services
Kevin Paterson	Director General	Spectrum Mgt. and Regional Operations

MANAGEMENT USE OF COMPUTER INFORMATION RESOURCES IN DOC

EDO (ONTARIO REGION)

Dave Lyon	Executive Director	EDO
Mike Connolly	Director General	Communications and Culture
Glenna Duguid	Director	Management Services
Hubert Pambrun	Director	Ottawa District Office

EDA (ATLANTIC REGION)

George Richard	Director General	Spectrum Management and District Operations
Roland Richard	Director	Engineering

INSTITUTES

CANADIAN CONSERVATION INSTITUTE

Charles G. Gruchy	Director General	Canadian Conservation Institute

COMMUNICATIONS RESEARCH CENTRE (CRC)

R. W. Breithaupt	Vice President	CRC
Michael Palfreyman	Interim Vice President	CRC
William Sawchuk	Director General	Broadcast Technologies Research

APPENDIX B

Survey Questionnaire

Appendix B

Survey Questionnaire

DOC MANAGERIAL SURVEY QUESTIONNAIRE

Name of Interviewee: _____

Sector: _____

Date Interviewed: _____

1. What is the nature of the information you work with? Is it related to finance? Human resources? Pay? Materiel management? Correspondence Management? Spectrum Management? Other? What computer systems do you use to access this information?

2. Do you depend on your computer for a large part of your information needs?

3. When you use your PC to retrieve information, is it easy to get at the information you need?

4. Are you getting the information in a timely manner? Do you find you have to spend a lot of time hunting or waiting for the information you need to do your job? When you receive the information you need, is it still relevant and useful to your work?

5. When you receive the information, is it presented in a format that you can easily use? If not, how would you like to see the information presented?

6. What kind of ad-hoc queries/requests for information are you called upon to answer as part of your work? When and where do these queries originate? How often do you get such queries?

7. What kinds of regular reports and/or statistics do you have to prepare? For whom? How frequently? Are there any reports that are required from you as part of some regulatory policy or legislation?

8. How satisfied are you with regard to the quality of the information you are getting? Is the information always up-to-date, accurate, reliable, complete, and relevant?

9. What information would you like to have but can't get (or get easily) at this time?

10. Please provide an inventory of the major items of computer hardware and software that you are presently using.

11. How satisfied are you with the performance your hardware and software in enabling you to carry out your work?

12. Do you use a graphical user interface such as Windows? Do you feel comfortable working with a GUI? Would you like to use a GUI such as Windows and Windows-based software?

13. Within the context of our discussion, are there any other remarks or comments you would like to add at this time?

APPENDIX C

Functional Specifications for a

Managerial Workstation Software Package

Note: This Appendix represents the result of work carried out in the early stage of the study under the initial Terms of Reference. The latter were subsequently revised as explained in section 1.2 of this document. This Appendix is included for reference purposes only.

Appendix C

Functional Specifications for a Managerial Workstation Software Package

Managerial workstation software packages are computerized systems that provide managers with easy access to internal and external information that is relevant to their critical success factors. Managerial workstation systems are also known by other names such as management support systems or management information resource systems.

Data plays a critical role in any managerial workstation system because it is the basis for the information provided. Therefore, it is of the utmost importance that any plan to implement a managerial workstation system must ensure that the underlying data is always available, accurate, reliable, and up-to-date.

The following pages present a functional specification for a managerial workstation software package.

General

From the manager's perspective the dialogue with the workstation software is the most important component of the system. Therefore, it is critical that the software is intuitive to use and user-friendly.

The workstation system should avoid elaborate log-on procedures.

The response time must be instantaneous - an average response time of more than five seconds is unacceptable.

The manager must have the choice of interfacing with the workstation system either via keyboard, mouse, or touch screen.

It is desirable that colour be used for presenting information.

The system must be able to provide context-sensitive online help.

Menus and a keyword index for locating screens should be available to help the manager find information.

Movement among screen components should be seamless (e.g., E-Mail might be a main menu option and not require a separate user ID).

Sequence or command files should be available that allow a manager to page through regularly viewed screens.

The inclusion of a "drill-down" capability to allow managers to go into more underlying detail when an exceptional situation is encountered is mandatory.

The screens must provide the names and telephone numbers of people who can discuss the information presented.

It is desirable that the workstation system be accessible from home or while travelling. This off-site use creates special communications, security, and support responsibilities.

Access capabilities should include current status information about the manager's unit, external news services, external databases, and E-Mail.

Training on the use of the workstation software should be one-on-one. Any system that requires more than an hour of training probably does not satisfy ease-of-use requirements.

User documentation should not be necessary for a well-designed workstation system. If documentation is provided, it should be not more than one page.

Graphical User Interface Support

In keeping with the fact that the workstation software must be highly user-friendly, a graphical user interface such as Microsoft Windows is highly desirable. The use of icons make such systems more intuitive.

A managerial workstation software package that operates under the Microsoft Windows environment can easily create links between extracted data and office systems software such as Wordperfect and Lotus 1-2-3 which operate under the Windows environment.

Query Generation

The managerial workstation software should allow the manager to create and store various views of the data in query formulations. Both the query formulation created and the data extracted through the query formulation should be capable of being saved on the manager's PC. Thus, once the formulation is created, the manager need only re-execute the query formulation every time he/she desires to refresh the viewed data from the database.

Query generation capabilities should provide managers with the ability to:

- specify what information is desired by clicking on data base tables and columns within tables;
- specify what subset of the information is desired by defining retrieval conditions (i.e. greater than, less than, equal to, not equal to)
- specify the sequence in which they would like to view the information (ascending, descending);

The software must be capable of performing range searching, date searching, and boolean searching.

Report Generation

The workstation software must be capable of providing the manager with an easy-to-use report formatting tool that can format extracted data into multi-column reports, form letters, tabular reports (spreadsheet type listings), and quick reports (i.e. the equivalent of printing the results of the query with no additional formatting.

The software must provide the manager with the capability to define report templates. The template specifies how the information will be logically organized and how the printed information will look. The manager may then link a previously created query formulation with a report template.

Graphics Capability

Screens should include graphical, tabular, and textual presentation of information. Standards should be established for any terms used, colour codes, and graphic designs. These standards help to avoid misunderstandings and reduce the amount of mental processing required to interpret information.

Must provide the capability of viewing extracted data graphically as pie charts, bar graphs, and scatter diagrams

Dynamic Data Exchange (for linking to other Windows applications)

Should be capable of taking advantage of Microsoft Windows Dynamic Data Exchange (DDE) feature which allows the linking of a query result to a spreadsheet or wordprocessing document with automatic update capability

Scheduling

It is desirable that the workstation software provide a scheduling function. This function provides for the capability to automatically execute a pre-defined query to refresh the extracted data at regular intervals, e.g. every two hours so that up-to-the-minute information is displayed.

DBMS Support

The workstation software must be capable of interfacing with the ORACLE database management system. It is highly desirable that the software be capable of interfacing with several other industry standard DBMS packages such as dBase, Paradox, Q&A, DB2, SQLBASE, Sybase, etc.

English and French Language Support

The workstation software package must be capable of operating in English and French.

Network Support

The workstation software package must be capable of running on a Banyan LAN server.

Platforms Supported

The workstation software must be capable of running on both IBM-compatible PCs and Apple MacIntosh microcomputers.

APPENDIX D

Preliminary Survey of

Managerial Workstation Software Packages

Note: This Appendix represents the result of work carried out in the early stage of the study under the initial Terms of Reference. The latter were subsequently revised as explained in section 1.2 of this document. This Appendix is included for reference purposes only.

Appendix D

Preliminary Survey of Managerial Workstation Software Packages

A high-level preliminary survey of available managerial workstation software packages was undertaken in order to identify potential candidates and to select the products that meet the basic criteria listed under "Preliminary Selection Criteria" below.

Preliminary Selection Criteria

The following features are required of such products:

a) intuitive to use;

b) require no programming by the end user;

c) can provide for "joining" multiple tables;

d) provide for ad hoc queries and printed output;

e) queries can be easily formulated, saved and catalogued for repeated use;

f) capable of running in a Microsoft Windows 3.1 environment

g) able to provide English and French versions;

h) able to operate in a Banyan LAN environment on MS-DOS based 386 or higher machines as well as Apple MacIntosh microcomputers;

i) able to access ORACLE database tables.

Methodology

The following steps for product selection were carried out:

a) Through the review of current literature including industry reports, market surveys, and other information sources, identify packages which should be considered.

b) For each of the products identified, determine if **all** of the preliminary selection criteria above are met. This was done through vendor contact, current user discussions, and product evaluation reports.

c) Shortlist the most suitable products for further, detailed evaluation. Evaluation to be done through site visits to user organizations and discussions with actual end users.

Potential Packages Identified

In carrying out step (a) of the methodology above, the following potential products were identified for consideration:

Product Name	Vendor	Telephone No.
PageAhead	PageAhead Software Inc.	(206) 441-0340
Easy SQR	SQL Solutions Inc.	(617) 270-4150
Pilot Lightship/Lens	Pilot Software	(617) 350-7035
Quest	Gupta Technologies (Canadian Distributor is SQL Tech)	(416) 483-7383
Forest and Trees	Forest and Trees Inc. (Canadian Distributor is Information Access Inc.)	(416) 602-5934
Impromptu	Cognos Inc.	(613) 783-6803
R & R	Concentric Data Systems	(508) 366-1122
Powerbuilder	Powersoft Corp.	(617) 229-2200
Commander EIS	Comshare Ltd. (Ottawa Sales Office 275 Slater)	(613) 236-9651

Apply Preliminary Selection Criteria

In carrying out step (b) of the methodology above, the following results were determined:

PageAhead	No French version, but would develop one if funded (US$40,000). DOC would receive an equivalent value in product (about 136 copies). Otherwise the product meets all preliminary criteria.
Easy SQR	French version not available. No plans to introduce one.
Pilot Lightship/Lens	French version not available. No plans to introduce one.
Quest	Meets all preliminary criteria including French version.
Forest and Trees	Meets all preliminary criteria including French version.
Impromptu	Currently available only in Beta release with product availability expected around spring 1993.
R & R	Does not run under Windows. Not a true ad hoc query language.
Powerbuilder	Not a managerial end user product.
Commander EIS	Meets all preliminary criteria including French version.

Shortlist Most Suitable Candidates

In carrying out step (c) of the methodology above, the following products were shortlisted for further evaluation:

Quest

Forest and Trees

Commander EIS