5Feb81

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Improvement of Access to DoD Scientific and Technical Information Part B--Analyses, Findings and Conclusions	5. TYPE OF REPORT & PERIOD COVERED Dec. 1979 - Dec. 1980 6. PERFORMING ORG. REPORT NUMBER IDA PAPER P-1537, Part B
7. AUTHOR(s) Murray Kamrass Vincent J. Berinati	8. CONTRACT OR GRANT NUMBER(s) MDA 903 79 C 0320
9. PERFORMING ORGANIZATION NAME AND ADDRESS Institute for Defense Analyses 400 Army-Navy Drive Arlington, VA 22202	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Task DTIC-1
11. CONTROLLING OFFICE NAME AND ADDRESS Defense Technical Information Center Cameron Station Alexandria, VA 22314	12. REPORT DATE December 1980 13. NUMBER OF PAGES 80
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Information, bibliography, on-line, security, data bases

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The regulations governing the implementation of DTIC are reviewed and lack of enforcement is found to be a primary factor in denying to DTIC about fifty percent of the information that should be in the files. A survey of DROLS users indicates that nearly all classified users would be unhappy about a change to a completely unclassified system, although the real benefits of the classified system are small, considering recent and pending improvements to the unclassified system. In addition, an

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20. unclassified system would be less expensive to operate for DTIC, the DoD and the users. The question of the value of information is partially addressed in this report, but a definitive answer is not found. The attitude of classified users is that the information they receive is well worth its present costs. For this reason, a completely unclassified on-line system is not recommended as a result of this study.

IDA PAPER P-1537

IMPROVEMENT OF ACCESS TO DoD SCIENTIFIC AND TECHNICAL INFORMATION

PART B—Analyses, Findings and Conclusions

Murray E. Kamrass
Vincent J. Berinati

December 1980

Prepared for

Defense Technical Information Center

INSTITUTE FOR DEFENSE ANALYSES
SCIENCE AND TECHNOLOGY DIVISION

IDA Log No. HQ 80-23090

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The work reported in this document was conducted under contract MDA 903 79 C 0320 for the Department of Defense. The publication of this IDA Paper does not indicate endorsement by the Department of Defense, nor should the contents be construed as reflecting the official position of that agency.

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Murray E. Kamrass
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INSTITUTE FOR DEFENSE ANALYSES
SCIENCE AND TECHNOLOGY DIVISION
400 Army-Navy Drive, Arlington, Virginia 22202

Contract MDA 903 79 C 0320
Task DTIC-1

PREFACE

This report has been issued in two volumes. IDA Paper P-1537, Part A, contains detailed background information on DROLS operations and is primarily intended for those readers who are not so familiar with DROLS. This volume, Part B, discusses the research performed by IDA in response to the task statement.

ACKNOWLEDGMENTS

The authors acknowledge with gratitude the many helpful comments of Jesse Orlansky and Albert M. Rubenstein, IDA staff members, who provided a technical review of this report. We acknowledge also the gracious cooperation of the Technical Information Services staff at IDA, most notably Mrs. Ruth Smith, Mrs. Evelyn Fass and Mrs. Nancy Venator. With their able assistance we were helped to understand what DROLS and technical information accession and retrieval are really all about. We would also like to acknowledge the contribution of Bernard Rider, an IDA consultant, who authored the response time investigation presented in Part A.

CONTENTS

ABBREVIATIONS

ADP	Automatic Data Processing
AFAL	Air Force Avionics Laboratory
AFWL	Air Force Weapons Laboratory
AUTODIN	Automatic Digital Network
CIA	Central Intelligence Agency
DDC	Defense Documentation Center
DLA	Defense Logistics Agency
DoD	Department of Defense
DRIT	DDC Retrieval and Indexing Terminology
DROLS	Defense RDT&E On-Line System
DSA	Defense Supply Agency
DSMS	Defense Systems Management School
DTIC	Defense Technical Information Center
FYDP	Five-Year Defense Program
IAC	Information Analysis Center
IDA	Institute for Defense Analyses
IR&D	Independent Research and Development (File)
MAI	Machine-Aided Indexing
MCIC	Metals and Ceramics Information Center
MIS	Management Information System
MUAC	Master User Address Contract
NAVMAT	Naval Material Command
NLDB	Natural Language Data Base
NRL	Naval Research Laboratory
NSA	National Security Agency
NTDSC	Non-Destructive Testing Data Support Center

ODUSDRE/R&AT	Office of the Deputy Under Secretary of Defense for Research and Engineering (Research and Advanced Technology)
R&D PP	Research and Development Program Planning (File)
RDT&E	Research, Development, Test and Evaluation
RSIC	Redstone Scientific Information Center
RTIS	Remote Terminal Input Subsystem
SBIE	Shared Bibliographic Input Experiment
SDC	System Development Corporation
STI	Scientific and Technical Information
TAB	Technical Abstract Bulletin
RPS	Text Processing System
TR	Technical Report (File)
TSE	Telecommunications Security
WUIS	Work Unit Information System (File)

I. INTRODUCTION

The Defense Technical Information Center (DTIC), under the overall direction of the Office of the Deputy Under Secretary of Defense (Research and Advanced Technology), OUSDRE, operates a DoD-wide on-line system that provides remote interaction with four major RDT&E data bases. The system was originally designed in the late 1960s to provide secure access to a computerized file containing classified descriptions of ongoing research efforts. This original file of Work Unit Information System data was set up as a management information system (MIS) intended to help keep DoD managers informed about ongoing DoD scientific and technical projects. Such a system would help to avoid duplication of technical effort, help managers and research personnel to stay knowledgeable about rapidly advancing science and technology and enable them to borrow and use ideas from each other that might be relevant to their projects.

Once the system was in place and operating, it became apparent that it could have a much broader application than the one for which it was expressly designed. Three data bases were added: The Technical Reports (TR), Research and Development Program Planning (PP), and Independent Research and Development (IR&D) files. The operational system became known as the Defense RDT&E On-Line System (DROLS).

Of the four files the TR file is by far the largest, containing about 1.3 million entries. Also, as might be expected, the TR file is the most frequently queried. Although it was designed and constrained to protect a small proportion (about 10 percent of intrinsically classified records, DROLS is now

very different in scope and intent from its original implementation with the work unit file. Because of what seem, from this time vantage point, to be arbitrary design decisions, DROLS is not compatible with any other DoD systems for electronic access to or transfer of S&T information. DTIC cannot, for instance, interface with and utilize the computer resources sharing and terminal access capabilities of the DoD-developed ARPANET. It has difficulty taking advantage of the many software and hardware developments in the ADP marketplace. These deficiencies are manifested by high costs for operation, access and enhancement.

DTIC has found some ways of circumventing the original limitations of DROLS. This year, for example, it has developed software that permits unclassified users to access unclassified fields that pertain to classified reports in the file. In addition, it is now possible for low-speed asynchronous dial-up terminals to access the unclassified DROLS files. Since this study was started, these and other improvements have been made to DROLS that effectively enhance unclassified users' capability to obtain almost as much information from the files as the cleared users. We believe that DTIC has gone about as far as it can in enhancing the utility of the unclassified terminals while still conforming to its mandate to protect classified information by releasing it only to those who are properly cleared to receive it. It has been able to accomplish what is has done so far, partly because only a small portion of the information in its files is classified and even of those reports that are classified, a number of fields such as title, AD number, authors and descriptors are not classified.

However, the protection of a small amount of classified information complicates further improvement of the system. It also maintains the high operating costs associated with secure operating systems.

In October 1979, during a ceremony commemorating the redesignation of the Defense Documentation Center to Defense Technical Information Center (DTIC), Dr. Ruth M. Davis, then the Deputy Under Secretary of Defense for Research and Engineering (R&AT), addressed DTIC on the subject of its role. Dr. Davis said that DTIC should expect to "work more closely with R&D managers in the Pentagon and provide them with technical and management information." In addition, she recommended that DTIC "play a more important role in the evolution of OUSDRE data processing activities ... and assisting and improving our management information systems as well." DTIC should "become part of a community providing internal and external interactive data processing support to OSD." It should have "R&D capability to take care of its own growing needs and the requirements of the Defense STI program." DTIC in the future will "contribute to the education and training of R&D managers in the use of DTIC and other data bases and in generating a Federal-wide information interchange program. It will also encourage the improvement of the quality of technical reports..." (Ref. 1).

In view of these changes in scope and intent, it seems reasonable to examine the purposes and priorities of DTIC insofar as they concern the handling of classified information on-line. For example, considering the latest developments in information technology, would there be a net advantage to DTIC and the Community it serves, as well as the Department of Defense, if DROLS became a completely unclassified system? What alternatives are available to DTIC to supply the needs of the community that uses classified information, if DROLS were limited to unclassified information? What would be users attitude toward such a change? What alternative courses of action do users have if they can no longer obtain classified citations from DTIC on-line?

In this study we have tried to examine these questions. We have had to remind ourselves continually that DROLS does not have in its banks much that would be considered by scientists and engineers as "real" data. DROLS provides primarily bibliographic information and management information such as who is working on what. DROLS then is really more a source of where to find it rather than of information and data. It is not the only such source that DTIC provides, but it is the most convenient, time saving and comprehensive source of where to find it information that DTIC offers. Unfortunately, although only a small part of this information is classified, it is necessary that the entire system be set up to protect this small proportion of classified information. Hence, all information that goes out to classified terminals must be encrypted and all such terminals must be located in appropriate enclosures and attended by properly cleared personnel. In addition, strict controls must be maintained on user protocols for addressing the system to ensure that users receive only the information they are permitted to receive by virtue of their security status and need to know.

DTIC asked IDA to provide an examination and analysis that might help to improve access to DROLS. Of particular interest was the question of whether DROLS should become a totally unclassified system, with classified user's needs handled by some other means. To examine this question IDA was asked to examine the basic objectives and priorities for providing on-line access to and communications of relevant DTIC-stored Scientific and Technical Information (STI) in support of Defense RDT&E programs and also the National science and technology community.

This report describes the work and results of this IDA effort, which was initiated on December 10, 1979. During the course of this work, DTIC initiated a number of enhancements of DROLS that improved considerably the service to the unclassified user. Some of these improvements came unexpectedly, and, since

some of the subtasks were made obsolete by the improvements, the study task was redirected by mutual agreement. In this report we have attempted to indicate the work that was accomplished in response to the original task statement as well as to the redirection.

II. SUMMARY AND CONCLUSIONS

In December 1979, the Defense Technical Information Center (DTIC) requested the Institute for Defense Analyses (IDA) to undertake a study of its remote terminal accessible bibliographic reference system known as the Defense RDT&E On-Line System (DROLS). The requested study was to consider the principal objectives and priorities involved in the operation and design of on-line scientific and technological data base systems in support of the Defense RDT&E community, to review the current secure communications service used by DROLS, to survey a sample of DROLS users to obtain their reactions to the proposition that DROLS become an unclassified system, to examine the need and utility of the classified information available from DROLS and to provide some cost information relative to classified and unclassified terminals.

Our examination of the applicable regulations, directives and instructions revealed a long list of documents whose intention is to make DTIC a central repository of Defense RDT&E information. The regulations also charge DTIC with the requirement to protect all such information that may be classified. There are some limits to the extent of DTIC's domain. For example, it is not authorized to have any information classified above the "Secret" level, nor is it to have any communications security or intelligence information in its files. In addition, DTIC is required to limit access to any information that might be classed as limited distribution by anyone, although, insofar as DROLS is concerned, this only prevents some users from seeing abstracts of such documents. The most significant limitation to DTIC's services and to DROLS is derived from another problem--documents that

should be submitted are simply withheld; thus, there is no indication anywhere in the files that such documents exist. We found estimates that as much as fifty percent of all documents that should be submitted to DTIC are withheld, thus severely hampering the effectiveness of DTIC and of DROLS in performing their assigned functions.

In the past year DTIC, in making improvements to DROLS, has made it possible to access the system and receive unclassified information from asynchronous dial-up terminals anywhere that they can connect with a telephone line. Furthermore, the system has been changed so that citations will be obtained to almost all reports in the file even on an unclassified terminal. Thus, the unclassified terminal will receive nearly as much information as will the classified terminal. This latter fact means little to most of the DROLS users who have classified terminals, who show no interest in the possible savings and better service to unclassified terminal users that might result from converting DROLS to an unclassified system. The prevailing attitude of classified terminal users is that the information and time saved in obtaining it on-line are well worth whatever it costs.

Further, we examined four possible alternatives that DTIC might follow in dealing with DROLS. It is our view that the best alternative for now would be to keep DROLS substantially as it is, a simultaneous classified and unclassified system. The basic reason for this conclusion is that the classified terminal users would object strenuously to such a change even though an unclassified system seems to be able to meet virtually all of their needs at lower cost to DTIC, all users and to the DoD.

The only disadvantage of not having a classified DROLS is that a small proportion of citations might be missing or less than complete. Nevertheless, the classified user could order the classified citations to be delivered by mail. Alternatively, if the user were pressed for time, he could order the reports themselves with some greater risk of ordering something that did

not meet his requirements. We found that since all authorized DTIC information would be available to classified users by mail or other means, though some small part of it may be delayed in coming if DROLS were unclassified, the problem boils down to the value of timeliness in obtaining information, a value that we feel we could not credibly determine.

More detailed findings and conclusions are presented in Chapter VI.

III. SOME BACKGROUND CONSIDERATIONS

A. PRIOR LITERATURE

There is a considerable body of literature that describes the developing situation in information science; but not all of it is relevant to the particular study we have made for DTIC. Rather a considerable proportion is devoted to the historical development of the field and some of it to policy development. This is especially true of Ref. 2, which deals with the problems of scientific and technical communication in both the context of the United States and on a worldwide basis. Another treatment in this genre attempts to forecast the situation in 1985 (Ref. 3). Reference 4, on the other hand, is more focused on the problems of DTIC. This study was done in 1975 for DDC by Auerbach Associates and is labeled as a 10-year Requirements and Planning Study. The work, which is based almost entirely on a large survey of DDC users, emphasizes the user's point of view in developing its conclusions. This study was focused on all DDC services, whereas the current study is directed only to DROLS.

One finding of the Auerbach report was that users prefer to deal with their local library rather than remote libraries. This finding encouraged DDC to develop DROLS as a service that is available to the local librarian rather than directly to the ultimate user at his desk or bench. DDC developed training programs to teach librarians how to use DROLS. According to the Auerbach report most users are unaware of the full range of DDC services. This has encouraged DTIC to engage in some low profile marketing of its services with the result that

many librarians are now familiar with DTIC services even though many bench-level researchers and managers could use more instruction concerning what information support is available.

One of the Auerbach report's more significant conclusions was that DDC should move to providing fact and information services as well as bibliographic and document-oriented services. This same kind of recommendation appeared in our limited survey of DTIC users. Thus far the holdings of only five Information Analysis Centers (IAC) can be identified on-line by DTIC users. Other IACs must be contacted directly by the user without going through DTIC. To change this, new DoD regulations are needed that will permit DTIC to expand into new data files. A recent DTIC Digest indicates that they are making plans to move in this direction. In addition, the Shared Bibliographic Input Experiment (SBIE) potentially will build a Defense On-Line Catalog at DTIC which also will serve as a referral clearinghouse for documents and data files from sources other than DTIC within the Defense Community.

B. THE AUERBACH SURVEY OF INSTITUTIONS

Part of the Auerbach Associates' study for DDC, the "DDC 10-year Requirements and Planning Study," involved a survey of fourteen U.S. Government agencies. This survey was called the Interagency Survey Report (Ref. 5) and its purpose was to develop a projection of goals, objectives, operations, services, and structure of the information environment that DDC will be facing through 1988. The findings were the following:

1. DDC's primary role is to serve the DoD RDT&E community.
2. DDC's secondary role is to serve Federal agencies.
3. DDC's tertiary role is to advance the state of the art of information processing in the nation.

The study points up the fact that technological problems of information processing are not as significant in defining the scope and nature of services as are the organizational and economic ones. Also, the available technology has not yet been exploited fully by the information community. The report urges that the parochial interests of military management information programs should give way to achieve implementation of effective RDT&E management information systems. They admit that no value measures of information have been developed that would be useful in making economic decisions. Rather, information has subjective and pragmatic value to its users, but there are no measures of this value. This finding is consistent with opinions and attitudes we found in our own user survey. The Auerbach report further urged DDC to develop and apply econometric measures to information processes and to increase its efforts to market DDC products and services.

The Auerbach study also suggests that DDC develop new products to satisfy a wider range of DoD information needs. For example, an effective RDT&E Management Information System would help RDT&E managers assess their options at decision points in their programs.

C. THE AINES REPORT

In January, 1978, a report (Ref. 6) was published by OUSDRE (Research and Advanced Technology). The author, Andrew A. Aines, was a senior staff associate of the National Science Foundation on loan to OUSDRE (R&AT). The purpose of the study was to appraise the health of the DoD Scientific and Technical Information (STI) programs. It was intended to result in improvement and growth of these programs.

This study was undertaken in response to the rapidly emerging large-scale use of advanced information technology, in recognition of the need for improved effectiveness of the many DoD information systems and also in recognition of the

fact that more than ten years had passed since the last formal study of DoD STI programs. Other factors were the enormous proliferation of information and recognition of the importance of information as a lever of power. The study was intended to suggest improvements that would be useful and compatible with how DoD STI programs should look in the mid-1980s time period. The study involved surveys and interviews with research and engineering managers as well as managers of DoD technical information programs.

Aines concluded that although the DoD STI program was active and operative it had a number of weaknesses, particularly in the area of management, that needed to be rectified. The management problems identified included the following:

1. Directives and regulations were outdated.
2. STI had low priorities in funding and in command attention.
3. Reorganizations were too frequent, personnel turnover was too high, and the status of information managers was too low.
4. Interaction between R&E managers and information managers was too low.
5. Data bases were not being used effectively.
6. The use of advanced information technology was not moving evenly or smoothly.
7. The benefits of a government-wide STI system featuring electronic interchange were not receiving enough attention.

Despite these management problems, DDC was probably (and still is) the most advanced information agency in the federal government. However, it was not using its capabilities fully to aid in improving National policies and programs.

Aines recommended various measures to offset these managerial problems. He urged that long- and mid-range plans be developed to relate OUSDRE, the military services and the other Defense agencies. A DoD coordinating council should be formed. A task group should be created to revise outdated STI directives and regulations and annual reviews of STI should be undertaken in OUSDRE and other Defense agencies.

Relationships between information agencies and other kinds of organizations such as professional societies, educational institutions and other governmental units should be studied and improved. Supervision of STI programs should be improved and collaboration among the STI, logistical and intelligence communities should be fostered. DDC should be upgraded to provide better support for R&D managers and research workers, and as a sign of this upgrading, its name should be changed to Defense Technical Information Center--a suggestion that has since been adopted.

IV. USER ATTITUDES TOWARD DROLS CLASSIFICATION

A. INTRODUCTION

Under the revised subtask b (see Appendix A) IDA was requested to survey a sample of DROLS users to obtain their reactions to the proposition that DROLS become a completely unclassified system. The amended subtask c was also dealt with by analyzing the survey. This chapter describes the survey and presents the results and conclusions therefrom.

B. METHOD OF STUDY

One approach to this study involved a questionnaire (see Appendix C) which was devised to be easy to use and convenient for both the respondent and the surveyor. Originally we had intended to survey all users of DROLS (about 100) but then we were informed that such a survey would involve severe problems in obtaining permission. However, we could interview people at up to about ten sites, plus personnel at IDA, without problems. So we decided that we would go to eight major users in the Washington, D.C., area and two outside. This would avoid incurring heavy travel costs. Since it was impossible to do a statistically valid survey with only eleven respondents, we felt the best we could do was to try to get some insights about user attitudes with this number of respondents. Nevertheless, we did try for a distribution of types of users to ensure that whatever opinions we did get would be reasonably representative. We used the following matrix (Exhibit IV-1) as a guide, and tried to provide a distribution of respondents as shown throughout the matrix.

EXHIBIT IV-1

DISTRIBUTION OF SURVEY RESPONDENTS
(U = Unclassified Terminal, C = Classified Terminal)

	LIBRARIES & SCHOOLS	R&D LABORATORY	OPERATING COMMAND
Army	Army Library (U)(C)	BRL (C)	
Navy		NSWC (C) NRL (C)	NAVMAT (C)
Air Force	AFOSR (U)	AFAL (C)	
DOD		DARPA (U)	DIA (C)
Contractor		IDA (C) Lincoln Lab (C)	

The method used in setting up the interviews was to telephone the individual, usually a librarian or information source person, listed as the DTIC contact in a DTIC listing of terminal sites. This individual was told what we were planning and that he or she would shortly receive a packet containing some descriptive material and several questionnaires. After they had time to examine the material, they were recontacted and an appointment for interviews was set up. Each contact was asked to line up two other individuals for interviews--one a researcher, the other a research manager. We had two reasons for this elaborate procedure. First, we felt that it would be more productive if people had an opportunity to read over the material and questionnaires before responding, particularly since some of the questions might involve finding some data. Second, we felt

that although seemingly less efficient than the use of a mailed questionnaire, the face-to-face interview would enable us to learn more and to detect nuances of intended meaning because we could probe somewhat further if the answers to some questions (or if the questions themselves) seemed inappropriate. Furthermore, we would be there to explain, as necessary, any or all of the questions.

As it turned out, this mode of conducting the survey was very fruitful. Nearly all individuals we surveyed had read the material beforehand and had marked up their questionnaires. Where cost and other data were requested they had taken the trouble to look up the information. The interviews themselves generally went very smoothly and quickly since the primary task was to transfer information from their questionnaires to ours. In most cases, the longest part of the interview involved a discussion of question 16, where the subjects were asked for their ideas on improvements to DROLS, or involved a general discussion of how each individual used on-line information in his work.

The questionnaire and introductory material that was sent out are reproduced in Appendix C. The findings are based on responses of 28 individuals at 11 organizations.

C. WHAT WE LEARNED

What we learned from the survey is not surprising. Those individuals at sites having classified terminals were almost universal in rejecting the idea of an unclassified DROLS, some of them emphatically. Some said that without being able to get classified information on-line, the whole point was lost and there would be no reason for DROLS to continue existing. The essential rationales for this attitude were:

1. The cost of a classified terminal is low compared to the value of the information that can be received in

a timely manner from it. The researcher's time is a far more precious quantity.

2. Many times quick response tasks are requested of researchers. Waiting for one or two weeks for information at the beginning of such a task would jeopardize their ability to meet the deadline.

3. A number of researchers use an interactive mode, looking over the shoulder of the terminal operator while a search is being done. Thus, they are able to guide the search more efficiently and ensure that it is structured appropriately.

On the other hand, the possessors of unclassified terminals were generally happy with what they had and were pleased to learn that their terminals would be capable of providing even more information to them in the future. They obviously did not object to DROLS being unclassified. In fact, due to the nature of their work, many users are not able to use classified systems. The Army Library illustrates this point. It has a classified and an unclassified terminal, both of which are in substantial use. The classified terminal is used by members of the military staffs at the Pentagon for project and program information. The unclassified terminal is used to answer requests for information under the Freedom of Information Act, press and media requests for information, and thesis information for members of the Armed Forces. Since none of the latter can contain classified information, the unclassified terminal provides a desirable automatic screen that assures them that they can use freely whatever information they receive.

D. COMMENTS ON OTHER FACTORS IN THE SURVEY

Of our twenty-eight respondents, fifteen, or more than half, were librarians or information resource persons, most of whom actually used the terminals. The reason for the preponderance

of persons of this type was that we had at least one from each organization who was the initial contact. In addition, sometimes the contact was timid about volunteering information unless his/her supervisor was present. In several cases both individuals were interviewed simultaneously, but even where separate interviews were conducted the response to any particular question was the same. This seemed to be true at most organizations. That is, where three or four individuals were interviewed at an organization, they all generally felt the same about DROLS and its need for classification. Hence, it is not certain whether the library or resource people were simply reflecting the views of the researchers they served or whether they had formed their opinions independently. At one site, we believe that permission to respond to the survey had to be granted by an officer of the institution, and that he had given instructions about how to respond to the questions about classification. All four respondents (two librarians) at this site were strongly opposed to an unclassified DROLS.

This illustrates one possible weakness of our method of polling where the organizational hierarchy has the opportunity to review the questions and to set out the organizational point of view before the interviews are conducted. On the other hand, the views of management are given an opportunity to be represented.

This clearly did not happen at some other places. One site provided examples where opposite opinions were found in the same organization. One individual, a researcher, insisted that he needed information quickly in order to do his work. He declared also that if he could not get information right away there was a strong chance that he would no longer be interested in it. At the same site, a manager said that although he needs classified information for his work, he could be patient and wait for a DTIC search since he was never in that much of a

hurry for the results. In fact, he much prefers the format of the DTIC search bibliography, a neat, stapled hard copy listing rather than the aluminized paper roll that he receives from the local terminal.

Nearly every organization we visited had one or more unique problems, thus making it more difficult and risky to generalize from this small sample to the entire possible spectrum of users. For example, one DoD organization, which one would think should have a classified terminal, has only an unclassified one, although they have been trying to obtain a classified one for some time. The problem seems to be something as trivial as who is to pay for the installation of an electrical wall socket in the vault space designated for the terminal. In another unique situation, an agency has what seems to be a ridiculously limited budget for acquisition of reports, so it insists on having as complete information as possible on each report before it orders, since it must be sure to order only reports that are needed. Despite these special circumstances we believe that the results of the survey identify the major needs felt by most DROLS users. In fact, if any group is unrepresented in this survey it is the non-users of DROLS whose opinions were not sought; however, we did have some informal input from other contacts outside of the survey that indicated they were insufficiently aware of DROLS capabilities to make active use of the system. Nevertheless, they felt they were getting good service from DTIC when they requested a DTIC search by mail or telephone.

E. RESULTS (See Exhibits IV-2 and IV-3)

To an overwhelming extent (21 out of 27), DROLS users indicated their preference for a classified DROLS over an unclassified system. The usual rationale for this was that their work required classified information and they had to have it reasonably fast so that they could complete their tasks in the

EXHIBIT IV-2

WHAT WE FOUND

ANSWERS TO QUESTION 14 ... WOULD YOU BE SATISFIED WITH AN UNCLASSIFIED DROLS?

	UNCLASSIFIED TERMINAL	CLASSIFIED TERMINAL	TOTAL	
STRONG YES	2	1	3	6
MODERATE YES	1	2	3	
INDIFFERENT	-	1	1	
MODERATE NO	1	6	7	21
STRONG NO	1 (ANOMALY)	13	14	

RATIONALES: CLASSIFIED ... NEED CLASSIFIED INFORMATION. NEED RAPID RESPONSE. COST IS NOT A FACTOR

UNCLASSIFIED ... NEED UNCLASSIFIED INFORMATION UNCONTAMINATED BY CLASSIFIED FOR FOIA REPLIES, PRESS AND ACADEMIC SEARCHES (I.E., THESES AND PAPERS). NO NEED FOR CLASSIFIED INFORMATION--CAN WAIT FOR DTIC SEARCH. ONE INDIVIDUAL PREFERS FORMAT OF DTIC SEARCH.

available time. This attitude was firm despite our suggestion that an unclassified DROLS would be much better in the future than it is today. But the users seemed to believe that they would be missing some citation that might be important if they could not get classified information on-line. Their point of view was that their time and the importance of the work they were doing justified any differential in costs between a classified and an unclassified terminal. Only one respondent in answer to question 15 indicated that the cost of a classified terminal is too high. No other response indicated that anyone thought that cost was a factor in this question (e.g., see answers to question 5). Moreover, all of those we talked to already had sunk costs in their setup. Removing the classified system would waste most of the sunk costs.

Although we must recognize the contrary views of our respondents, there are some strong arguments for going to an unclassified DROLS. For example, although the users want assurance that they are getting complete bibliographies, a number of factors besides classification limit the completeness of information provided by a classified search. We shall discuss these here:

- Classification: By regulation DTIC has no Top Secret information in its files. Neither can it have cryptographic and communications security or communications and electronic intelligence. Moreover, the searcher and his organization must have a need-to-know in the particular areas in which he is searching.
- Limited Distribution: Roughly 50 percent of the DTIC Technical Report files are limited in some way other than classification. Limits are placed by the originating agency of the study. They may

permit distribution of the entire summary to DoD, Government, or anyone. In addition, other limitations may be placed on contractors depending on their fields of interest. A distribution limitation in DROLS denies only the abstract but not the complete citation of a limited document as it would appear in TAB.

- If a Technical Report is unclassified and unlimited, it is provided to NTIS, which then makes it available for public sale. This happens in the case of about 50 percent of all Technical Reports. NTIS leases the bibliographic tapes of this information to one or more of the commercial data bases.

- Independent Research and Development File: Since the IR&D files contain information that is regarded as proprietary, no contractors, not even Federal Contract Research Centers (FCRC's), are permitted to access these files although they are available to DoD users.

- Data Not in Files: Despite clear, unambiguous regulations and directives regarding the submission of reports and work unit data to DTIC (see Part A, Chapter II of this report) estimates reveal that about one-half of the information that should be submitted to DTIC is not (Refs. 7, 8, 9). We have little evidence of the reasons for this, but we infer that there are two major ones:

(1) the responsible individuals do not consider the submission of reports to DTIC as a serious responsibility, perhaps because there are no sanctions in the regulations or directives if they are not obeyed, and (2) there are some organizations or individuals in the Services who do not want to make public (even to the limited DoD public) what they have been doing. This suggests that DTIC should undertake some attitudinal research to determine how it might best obtain cooperation from those who are withholding information.

- Purging of Files: To conserve on-line storage space, DTIC removes all records (except AD number) in the interactive retrieval files for documents that are more than ten years old. Thus, a subject search on-line that might turn up older documents is incomplete and must be continued off-line by examining hard-copy documents. The alternative is to order an off-line printout including a "delayed search," which provides the full records for all the cited documents.

Another argument for making the system unclassified is that it would be possible to interface with the various information and computer resource sharing networks (e.g., ARPANET) that can handle only unclassified material. This could allow greater use and flexibility of the system in acquiring and manipulating STI. Furthermore, an unclassified system could be controlled and managed by means of existing software packages of the type now used by the commercial data bases. This would overcome some of the more common criticisms of DROLS that we received from the users (see next paragraph (F) of this section).

We conclude that a searcher in DTIC's files is usually going to receive only a large fraction (perhaps no more than half) of all the information that he should and would like to have no matter how efficient and skilled a searcher he is. This is true whether he has a classified or unclassified terminal. Using a classified terminal may result in receiving at most a few more citations than in the average search over an unclassified terminal, but it cannot ensure completeness until the other information flow inhibitors are overcome.

So we conclude that a classified system may provide more information than an unclassified one, although at this point we do not have the data that tells how much more complete or useful for research and development such a system would be.

Despite these positive reasons for converting DROLS to an unclassified system there are some strong reasons for not taking this action. First of all, most classified users are strongly opposed, because they feel that they would be denied significant information if they could not access classified files. Statistical arguments (about the proportion of classified information in the files) do not sway this point of view. The counter-argument is made by users that some areas of technology are nearly all classified and an unclassified search in such an area might result in few if any of the possible finds. They claim that it does not matter that there are many stronger inhibitors than security classification (see above), to the flow of information, the fact is that they have the need (and right) to obtain such information through a real-time system such as DROLS.

It is difficult to argue with this point of view: these users have in fact paid their dues by installing the proper facilities for receiving classified information and by having secure environments for the use and storage of such information. They see no reason why it should be denied to them by what might appear to be an arbitrary decision by DTIC.

F. SOME OTHER COMMENTS ON DROLS

All users were complimentary about DROLS and indicated that they were pleased with the service. Nevertheless, many of them had comments on how they would like to see the service improved. Nearly all of these comments came from the librarians or information resource persons who actually used the terminals. Although these comments are not new to DTIC, we believe that it would be of interest here to indicate to DTIC what some of the concerns of the users are in the context of this study.

The gist of most of the comments we received was that they would like to have DROLS operate in the same way that Lockheed's DIALOGUE and other commercial on-line services now operate. For example:

- DTIC should provide a full Boolean search strategy. The partial Boolean now available is too limiting for sophisticated and efficient searching.
- An on-line thesaurus would be helpful.
- Also helpful would be the ability to narrow a search without starting over again.
- A higher response speed on page shifting would also be desirable.
- There is no convenient way of tracking from work units to the technical reports that resulted and vice versa.
- Many documents such as proceedings of symposia and meetings and classified journals have individual articles in them that are not reachable as citations in DROLS unless they have been entered in the files separately. This results

in loss of availability of many possibly valuable citations. The suggestion is to provide individual cataloging for the separate papers included in such documents.

- The terminology in DRIT is years behind the current terms in such fields as electronic materials. This inhibits the ability of searchers in advanced fields to find citations. What the librarian would like is a more flexible system that would enable the users to search on their own terms which presumably represent the most advanced thinking in each field rather than being restricted to a dictionary of obsolete terms. Limited text searching capability has been introduced in DROLS recently, but it does not fully meet this need.

- Some DROLS users also put program planning, work unit and technical report data into the system. It would be helpful to such users to have an on-line format generator.

- For documents older than ten years only an AD number is available on-line. Since ten years is an arbitrary length of time to decree that work in technology is obsolete it would be desirable to provide some way of getting more information about such documents on-line.

- Many respondents are concerned about the time consumed by mailed reports and bibliographies getting to their requestors even though they

are in the local DTIC area. We heard of delays approaching two weeks, although ten days is more frequent and six days seems to be a minimum. It is difficult to apportion these times among DTIC, the U.S. Postal Service and internal processing and distribution at the requestor's organization. DTIC claims to get reports and requested bibliographies into the mail in 4-6 days. This could be an upper limit to delivery time if DTIC used a local courier service to deliver documents to Washington area users on the day they were ready.

EXHIBIT IV-3

SURVEY SCORE BOARD

		N	%
1.	Please identify yourself:		
	a. Information Specialist	15	54
	b. Researcher	8	29
	c. Research Manager	5	18
	TOTALS	28	100
2.	Estimate your use of DROLS over the last year.		
	a. Daily	11	39
	b. Weekly	5½(1)	20
	c. Monthly	10	36
	d. Yearly	1½(1)	5
	e. Never (See Note 1)	0	0
	TOTALS	28	100
3.	What proportion of your collection of documents is classified?	0 - 90%	
4.	Have you used commercial on-line bibliographic services?		
	a. Yes	16	57
	b. No	7	25
	c. No Response	5	18
	TOTALS	28	100
5.	Why do you not have a classified terminal?		
	a. No need for classified information	1	17
	b. Little need for classified information	3	50
	c. Cost	0	0
	d. Terminal procurement difficulties	0	0
	e. Secure facility difficulties	4	67
	f. Information otherwise available	2	33
	g. Other	1	17
	TOTALS	10(6)(3)	184(2)

		N	%
6.	How do you justify the additional expense of a classified terminal?		
	a. Need classified information	19	83
	b. Response speed	14	61
	c. Cost not a problem	3	13
	d. Terminal provisions not a problem	0	0
	e. Other	0	0
	TOTALS	36(23)(3)	157(2)
7.	Would you consider changing to an unclassified terminal?		
	a. Yes	3	13
	b. No	17	74
	c. No Response	3	13
	TOTALS	23	100
8.	How was the capital expense of your terminal funded?		
	a. Library	8	29
	b. Organization	7	25
	c. Project	2	7
	d. Other or no response	14	50
	TOTALS	32(28)(1)	111(2)
10.	Who funds the operational expense of your terminal?		
	a. Library	7	25
	b. Organization	7	25
	c. Project	2	7
	d. Other or no response	14	50
	TOTALS	30(28)(3)	107(2)
12.	If only unclassified service were provided what would you do about missing information?		

		N	%
a.	Nothing	5	22
b.	Order classified entries	11	48
c.	Order classified reports	13	57
d.	No response	3	13
	TOTALS	32 (23) (3)	112 (2)

14. Would you be satisfied with an unclassified DROLS? (See summary of this question in Exhibit IV-2)

15. Why?

a.	No strong need for classified bibliography	3	11
b.	Can function adequately without	4	14
c.	Cost of classified terminal too high	1	4
d.	Can use DTIC searches	5	18
e.	Difficult to provide for classified terminal	0	0
f.	Strong need for classified information	15	54
g.	Classified search is faster	16	57
h.	Search more fruitful in-house (See Note 2)	14	50
	TOTALS	58 (28) (3)	208 (2)

NOTES: (1) One-half is used to designate the situation where a user was uncertain between two intervals of the time scale. Answer "e" is as expected since the respondents were selected as users.

(2) Totals greater than 100% indicate that one or more respondents gave multiple answers to the question.

(3) Number in ( ) is actual number of respondents to question.

V. DISCUSSION

A. GENERAL

As we have noted earlier, DTIC is considering changes in its on-line system that would extend its responsiveness through making it possible to use value-added communications networks, and that would make possible the use of commercial software for the operating system. The barrier to potential improvements is the problem of security classification. If DROLS could be unclassified, then more operating economies and improvements could be made, but if DROLS must remain classified then the system may have been improved about as much as it can be.

B. DROLS FUNCTIONS

DROLS presently performs two functions. One of these is to provide bibliographic services to individuals and organizations engaged in research and development. The second is to provide management information to program managers and management offices. Even in this second function, DROLS is severely limited in that it does not provide precise management information. The Work Unit files and the Program Planning files, for example, tell who is doing what and where it is being done. They offer only order-of-magnitude cost information; for more accurate information it is essential to contact the agency that is actually doing or sponsoring the work. The Program Planning and Work Unit files are no better than a bibliography; they tell where to find the real information that one might be looking for.

It is clearly desirable that the DTIC system provide more direct on-line access to and manipulation of actual R&D program data rather than bibliographic-type reference. The problem here is that security restrictions made such changes very difficult if not impossible. Due to these restrictions the system is inflexible, which means that data bases cannot be added without inordinate difficulty to ensure that they are properly protected. It is not possible to program on-line, nor is it possible for DTIC to use commercial program packages such as those used by Lockheed and SDC to identify and verify users and to operate the system. Not being able to use such packages presents a major disadvantage to DTIC, which is forced to do all its programming internally, and which is saddled with an inflexible system that is difficult to improve or expand.

The task statement mentions a dichotomy that exists between the DTIC mission to disseminate information and the requirements for security of the classified information that is included in the files. The authors assert that no real dichotomy exists. Rather, the primary function of DTIC is to store and disseminate information to all those who need it. Security regulations only limit dissemination by defining who needs the information and by prescribing the means to be used to prevent others from obtaining it.

C. ALTERNATIVES FOR DTIC

We discuss four courses of action for DTIC with respect to dealing with the on-line situation discussed above.

1. Continue DROLS as the combination classified-unclassified system that it currently is. Recent modifications of this system enable DTIC to provide uncleared users with almost the same service that cleared users receive. Further planned changes will make this difference even smaller in the future.

2a. Change DROLS to a completely unclassified system. This will simplify making the kinds of improvements that many users would like to see, by making it possible for DTIC to purchase software packages that security requirements will not permit and will reduce operating costs for both DTIC and its users. But this also reduces the ways available to cleared users to obtain classified information.

2b. Completely unclassify the external portion of DROLS but retain the internal classification so that classified searches can be done in-house. This would reduce costs to users while increasing their inconvenience. Classified bibliographies could still be obtained by ordering a DTIC search. This mode would save DoD and DTIC some money because the DTIC facilities in Los Angeles and Boston would no longer be needed. Also, there would be savings in communications costs and in the maintenance of crypto equipment that would accrue ultimately to the DoD. However, the savings and convenience to DTIC will be limited because it must retain computer security for its in-house terminals.

3. An intermediate option between these alternatives is to create two essentially separate systems, one classified, the other unclassified, using two computers and two separate and different modes of communication. Then it would be possible for DTIC to improve the unclassified files in any way that it wanted without being concerned about security. This might also simplify the problem of making improvements to the classified system.

Alternative 3 presents some problems of its own. For example, the cleared user, in order to do a complete search,

would have to search two data bases or at best initiate the search differently. Furthermore, it is not clear how the information should be split between the bases. One way of dividing up the files is by fields, placing all classified fields in the classified computer and everything else in the unclassified computer file. With such a scheme the uncleared user would be served about as well as today, while the cleared user would have to access two files. This also creates an input problem for DTIC since the division of the files for this purpose would have to be accomplished carefully to ensure that nothing classified was stored in the unclassified computer. Since this alternative creates problems for both DTIC and its classified users, we believe it to be the least desirable alternative, especially considering how effective the unclassified DROLS has become. Moreover, the present system handles reliably differences in classification from Unclassified to Secret as well as need to know. On top of this it also establishes effective control over limited distribution information

Also, we think it inadvisable to adopt alternative 2a or 2b at this time. The reason for this is politic and psychological rather than logical or economic. Our survey of users (see Chapter IV) shows that they would object strenuously to changing the system in this way, even though they are not likely to notice any essential difference in the way that it operates. But, rightly or wrongly, they do feel that they would be denied some vital information if they could not obtain it through their terminals, and they would resent the delay involved in trying to obtain references by other means. One aspect of this is that the cleared users seem to consider themselves as belonging to some kind of exclusive club, to which they have, in some sense, paid their dues by having a classified terminal and facility and they do not want to lose any of the benefits of membership, even though such benefits may be largely illusory.

There may be ways to overcome this kind of objection to an unclassified system. For example, even though a cleared terminal could not receive classified information in an unclassified system, it would be given the unclassified fields as unclassified terminals now receive. If any classified information is denied to a formerly classified terminal because the system has been made unclassified, then the document itself could be automatically sent to the requestor (perhaps without charge) thereby demonstrating a "membership benefit."

D. ALTERNATIVES FOR USERS

Becoming unclassified does reduce the utility of DROLS to its users who now have classified terminals. But, in fact, the unclassified DROLS has been improved so much that the classified user will receive little more information than will the unclassified user. Moreover, making the DROLS unclassified does not deny the user the classified information that he needs and would like to have. To get such information if he has only an unclassified terminal, the classified user must request DTIC to do a batch search and to mail the results to him. Thus, there is a delay of perhaps six to fourteen days while the user waits for the results of his search. (We presume here that DTIC retains the ability to do such searches in-house.) There is still another alternative available to the user who may be in a hurry. He can simply order any classified documents that his search reveals without waiting for the complete citation. In this case he may receive some documents that may not be useful to him, but he can receive those documents as quickly as though he might have seen the complete citation. In addition, users who are knowledgeable about the technical fields they are working in know other sources of the information they are seeking and do not need to rely on DTIC for all of their information.

So, in effect, what we are dealing with primarily is some extra time to obtain partial bibliographical information. In fact, this extra time need not be spent if the user is willing to order reports from less than complete citations, and take the chance that some of those reports that he orders in this way may not be useful. If we try to examine the value of time, here is what we run into.

E. VALUE OF TIME

The question of the value of time and information is tricky. It might seem possible to assess the cost of a delay in obtaining information by adding up the cost of additional researchers' time spent in waiting. But this assumes that the researcher is nonproductive while waiting, when in fact he or she could be working on another project or studying unclassified literature until the classified material arrives. Another way of looking at the value of delayed information would be to examine the cost to an organization of not winning a contract because a proposal was late or incomplete due to missing information. But this presumes that the quality of the proposal relative to other proposals remains the same except for the contribution of the new information. Still another way of assessing the value of delayed information would be to determine the cost of duplication of an R&D effort because information was not available in a timely way.

With any of these methods of assessing the value of information, there is a presumption that the researcher and research manager are not knowledgeable about what is happening in their own fields and that they do not have the resources or resourcefulness to use other means of getting timely information. Included among these other means are personal contact with individuals and organizations in their own areas of expertise. Still another way of getting information can be inferred from

the fact that DROLS provides only bibliographic information. If "real" data and facts are needed, the only way that DROLS can help is to tell the user where to find them, including knowledgeable individuals, if requested. Citations to classified reports will be given to all users, classified and unclassified. However, the classified citation is likely to be somewhat more complete than the unclassified. Hence, the user receiving unclassified information will have less information to decide whether or not the report will be useful. If he is uncertain and if it is important enough he can order the report and receive it after the same delay that the cleared user might undergo.

Reference 10 reports on a client survey conducted by the NASA Industrial Application Center at the University of Southern California. Telephone interviews were conducted on a random sample of clients. Of the total 159 clients interviewed, more than 53 percent identified dollar benefits of on-line searching. Furthermore, a direct relationship was shown between client dollars invested and benefits derived from the research. The average ratio of benefits to investment was 2.9. We note that this ratio is a result of the perception of benefits as determined by user and that in some cases the ratio was considerably higher (about 10-20). While we would question this method of gathering data on this subject, there seems to be no question in most client's minds that they benefited significantly from the information service.

Thus, we conclude that determination of the value of information would be extremely difficult with results that are not likely to be credible because they involve unacceptable assumptions. Moreover, the denial of information by an unclassified DROLS is a denial only of partial bibliographic information and is in no sense a denial of the "real" information that the user would like to have. It only impinges on the decision as to whether or not to order a report or reports that the bibliographic record indicates might be useful. Considering the

general incompleteness of the bibliographic record (see Paragraph IV-E), we believe that the classified DROLS offers very little more to the user than would a completely unclassified DROLS.

VI. FINDINGS AND CONCLUSIONS

A. FINDINGS

1. DROLS Service

DROLS serves a growing body of users from about 100 remote terminal sites. The system provides both classified and unclassified bibliographic and other services to a variety of users, most of them DoD, or affiliated with DOD. The service is heavily used by a few users and only moderately used by most, but the instances of dissatisfaction that we found were related not to the basic service, but to the fact that commercial on-line services (unclassified) have surpassed DROLS in their ability to provide ease of access to and use of a data base. Most such comments were variations of "Why can't DROLS do it like _____?"

2. Limitations on Effectiveness

Searching for information in the DROLS files is severely hampered by the fact that (1) the files are incomplete, thus reducing citations available on-line, (2) information is not in the file because it has a higher classification than DTIC is authorized to receive or because it is not submitted to DTIC despite the fact that regulations require such submission. The net result of these omissions is that a searcher can receive no more than about one-half of the references that he would like and should receive for completeness. Since only about seven percent of the citations in the TR file are classified, the effect of classification on denied information is likely to be a small component in these proportions.

3. Classified versus Unclassified

A survey of a sample of users indicated that those who now have classified service would be very reluctant to trade that off for a greatly improved unclassified service that would provide nearly all the bibliographic information that the classified system includes.

4. Costs (see Appendix B)

For a representative site, the one-time costs of installing a classified terminal are about $11,000, while an unclassified terminal could be obtained for an initial one-time installation cost of less than $100. We assume both kinds of terminals are leased. Based on actual IDA experience, monthly operating costs for the classified terminal would be about $1,000 while the same for an unclassified terminal might be $145 plus telephone line costs. Telephone line costs can be a large variable depending on the location of the user's facility and how much connect time is used. It may be more economical for some non-local users to have a dedicated telephone line even though they have an unclassified terminal and could use a dial-up access mode. Since we did not interview people who have no terminal, we have no notion of whether such costs deter organizations or individuals from acquiring a terminal or whether the difference between the two would influence the selection of terminal classification. But among the terminal users whom we did interview, the universal attitude was that the information and the convenience in obtaining classified or "all" information are well worth whatever it costs; on the other hand, these individuals do not pay for these services. Their organizations, and ultimately the DoD, do.

DTIC in-house costs may not be significantly reduced by going to an unclassified DROLS unless DTIC also gives up doing classified searches. If classified searches are provided, then the entire internal operating system must remain classified and security arrangements at the Cameron Station facility would not

be significantly changed by having an unclassified DROLS. However, savings could be realized by closing down the classified Boston and Los Angeles offices, which would no longer be needed.

Another change, which we discussed earlier, would be to institute a dual system with separate classified and unclassified parts. Here again it is difficult to see much savings from such a system with the possible exception of using commercial software for changes in the unclassified system. But since the classified services would continue to be offered, such cost savings could be only minimal.

DTIC might also make DROLS completely unclassified, internally as well as externally. Then all security costs associated with DROLS could be eliminated, but the savings would be limited because DTIC itself must remain a classified facility since it must store and supply classified documents for all DoD agencies. Other savings would accrue to both DTIC and the DoD from eliminating the need for maintenance of cryptographic equipment and from users optimizing communications charges by using dedicated lines or dial-up, depending on their volume of business and distance from Cameron Station. Many local users, for example, who now pay for dedicated lines, would have virtually no communications costs if DROLS became unclassified.

5. Possible Improvements

DTIC clearly desires to improve its services to its clients. The clients would welcome better service and some have suggested what they would like. The most common suggestion was that DTIC should modify its software to permit searching in a similar way to that permitted by the commercial on-line services, such as Lockheed or System Development Corporation (SDC). This problem appears to stem from DTIC using "home-grown" software rather than commercially available programs. Unfortunately, security requirements prevent the use of commercial software. These improvements include complete Boolean search strategy, on-line

indexing and retrieval terms, and elimination of look-up codes for organizations and subject areas. We are aware that these suggestions have been made before, but we feel that it may be useful to repeat them in the context of this report. A more complete list of user suggestions can be found in Chapter IV.

B. CONCLUSIONS

- There is no real dichotomy, as mentioned in the task statement for this study, between the services that DTIC is designed to offer and security requirements. Security requirements only state limits as to who is to receive certain kinds of sensitive information, whereas the mission of DTIC is to disseminate information as widely as possible, within security limits. In fact, security limitations are only one of the lesser limiters of DTIC information disseminated with the aid of DROLS.
- The most important limiting factor on DROLS effectiveness is that many documents are not submitted to DTIC and hence not represented in the files. About 50 percent of all documents that should be submitted are missing despite regulations and directives that require such submission. Still another important limiting factor is distribution limitations that are frequently used to limit the flow of information.
- The unclassified service that will be offered on DROLS in the next few months will be virtually as complete as the classified service.
- The order of overall desirability of alternatives for the future of DROLS is the following:

1. Retain the present classified and unclassified system.
2. Make DROLS service to external terminals completely unclassified, but retain in-house classified service.
3. Make DROLS completely unclassified, including in-house service.
4. Convert the present DROLS into two separate systems, one classified, the other unclassified.

- DTIC users have suggested ways to improve DROLS that seem desirable. Most common among these is the suggestion to design protocols for addressing and using the system similar to the commercial on-line data bases.
- Finding ways to increase the completeness of its files and creating a more user-oriented on-line system would be a researchable and desirable activity for DTIC to engage in.
- Users who currently have classified terminals will object strenuously to changing to an unclassified DROLS. To offset such objections, it is suggested that such users would be given certain privileges, that would not be given to unclassified users, such as automatic sending of any classified document cited either wholly or partially during a DROLS search by a classified user.

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APPENDIX A

SUMMARY OF RESEARCH PERFORMED

APPENDIX A

SUMMARY OF RESEARCH PERFORMED

In December 1979, the Defense Technical Information Center (DTIC) requested the Institute for Defense Analyses (IDA) to undertake a study of its information retrieval system known as the Defense Research, Development, Test and Evaluation (RDT&E) On-Line System (DROLS). The original work statement involved five subtasks. Subsequently, after some work had been done on each of the subtasks, DTIC announced some changes in DROLS that had not been scheduled when the original work statement was drafted. Accordingly, the study task was redirected by mutual agreement to reflect the later status of DROLS and the work proceeded. The redirection changed three of the five original task statements, one was deleted and one was unchanged. In this summary we shall review the task statements, both original and redirected, and indicate briefly what was done about each and where the details of the task investigation can be found in this report.

A. SUBTASK A

This subtask requested IDA to consider principal objectives and priorities involved in the operation and design of DTIC's on-line Scientific and Technological Information (STI) data base systems in support of the Defense RDT&E community. In response to this subtask we reviewed relevant documentation including regulations and directives and discussed the subject generally with a variety of DROLS users. We found a vast number of regulations and directives have been issued by the Department of Defense and all of the military services that relate to the

operation of DTIC and DROLS (refer to the References in Part A for a sample listing). In particular, descriptive material for all ongoing and completed RDT&E projects must be submitted to DTIC. The methods and responsibility for submitting this information are detailed in these regulations. There is no doubt about what should be done. Yet many military agencies ignore them and fail to submit the information that they are required to submit. The net result of this neglect is that the DTIC files are incomplete. The amount of information missing ranges up to 50 percent, according to some estimates. It would seem that with such a vast amount of information missing, DTIC would be severely crippled in the performance of its primary function of being the central depository and single access point for all Defense RDT&E information. The potential danger involved is that the flow of information is grievously impeded, resulting in ignorance of important research findings, duplication of effort, possibly unbuilt or poorly performing systems and greater costliness of U.S. Defense RDT&E efforts. It is clear that the problem cannot be handled by the present set of regulations. The present regulations are complete; but they are largely ignored. Unless some teeth can be put into the regulations and enforcement encouraged from the top down, the situation is likely to continue. Work on this subtask, which was not changed, is discussed further in the first volume (Part A) of this report.

B. SUBTASK B

This subtask originally required IDA to review the current secure communications system used by DROLS. We also were required to identify unclassified on-line services that could access unclassified data and determine the principal characteristics of communications services, including their costs. In response to this original subtask we developed a model representing a computer-communications system. The model provides a

method of calculating the various principal characteristics of the system, and is appended to Part A of this report.

This subtask was redirected to require a survey of a sample of DTIC users to obtain their reactions to the proposition that DROLS become a completely unclassified system. We found an overwhelming majority of those DROLS users who had classified terminals insisting that they remain so, while the unclassified users were, by and large, satisfied with what they could get from DROLS. This survey is described and the results provided in detail in Chapter IV of this volume.

C. SUBTASK C

This subtask initially requested us to look at the question of using unclassified terminals to access a data base, part of which may be classified.

Since DTIC has been doing exactly this for almost a decade with no evidence that its classified information has ever been compromised by an on-line user at an unclassified terminal, the question seems somewhat academic. Moreover, there are now commercially available a variety of "security kernels" that have the capability of handling multi-level classification schemes including such items as the need-to-know. However, these capabilities of commercially available software have not been verified and consequently this software is not yet approved for DoD purposes. Another problem with any such scheme is that the remote terminal must be in a properly secured area and access to the terminal itself must be given only to those who have appropriate clearances. If such control of the remote ends of the system cannot be achieved then the entire system could be compromised. However, there seems to be no real problem in maintaining the system security if the classified terminals are kept secure, even though both classified and unclassified users can access the files.

Subsequent to the work reported above, subtask C was redirected to require that we determine the need and utility of classified information as available from DROLS to representative system users.

To determine this need we relied on the survey mentioned under subtask B above. The general findings are that classified users need essentially complete information to do their work effectively, and they are not willing to have their search results truncated because of classification. See Chapter IV for more detail.

D. SUBTASK D

This subtask requested us to examine the possible impact of AUTODIN II on DROLS if it became the universal telecommunications medium for all DOD installations.

Before this task was redirected we had the time to give only some very preliminary thought to this question. The response time analysis that was done in answer to part of the original subtask B described above applies in part here (see Appendix D, Part A). However, this analysis was abandoned when the task was redirected since it needed more data for completion.

The changed task requested us to provide some cost information for both classified and unclassified terminals. We could not find any significant difference in manpower costs due to security, but there are some differences in the one-time and operating costs of the two types of terminals. Costs are presented in Appendix B.

E. SUBTASK E

This subtask requested us to examine the possible impact of office automation developments, including the paperless office and laboratory to determine how such developments may enhance

the functions of DROLS. This subtask was deleted and no further report appears in this paper beyond the following paragraph.

Until the task was redirected we managed to accomplish an initial gathering of information and only some very preliminary thinking about this question. There did not seem to be much applicability to DROLS at present, but teleconferencing, full page image transmission, and systems based on film or video disc, perhaps controlled by computer, may be promising applications for information processing and transfer to the user. Generally, paperless operations might enhance DTIC internal operations much the same as they would enhance almost any organization's internal operations.

APPENDIX B

THE COST OF HAVING A REMOTE TERMINAL

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We present here three sets of costs, two of which show the costs of acquiring and operating a classified terminal, and one of which shows the same for an unclassified terminal. The two classified terminals costs apply to different times ... 1969 and 1980. In this approximately one decade, costs have not varied much despite the general inflation in the economy. In fact, operating costs have actually diminished. The primary reason for such cost behavior must be attributed to the great advances that have been made in the technology of electronic data processing in this period.

The 1969 cost data were taken from a DDC report by Richard K. Bennertz that described the various phases involved in the development of the DROLS (Ref. B-1). The other two sets of costs are actual site costs that might apply to a user in the current time. These costs are IDA costs and reflect IDA's particular situation. IDA already had a vault and the only requirement was to find some work space for the terminal, crypto equipment and an operator. So site preparation costs were fairly nominal in such a case. Also, monthly operating costs are highly dependent on the user's proximity to DTIC, which affects primarily the costs of a dedicated telephone line, or if a dial-up mode is used it will affect user charges. For example, a local call for IDA would cost essentially nothing, but a call might cost a substantial amount from a more remote location such as the U.S. West Coast. On the other hand for an unclassified terminal the one-time costs are quite nominal, assuming the terminal will be leased rather than purchased, although even

here, prices have been coming down rapidly so that the purchase of a terminal could hardly be considered a major expense for most DTIC users.

There are some other costs involved in having a classified terminal. These include some share of the security overhead, the need for having crypto-cleared individuals available, and an operator. However, in no case could we find that these costs added anything significant that could be charged to the terminal. For example, the security force is not likely to be increased due to a few square feet of vault space dedicated to a terminal in any organization that has to maintain a secure environment anyway. Similarly, the individuals needed to operate the crypto equipment have to be on hand for other reasons and the amount of work the crypto requires involves a tiny fraction of their time. The operator's job is the same whether or not the terminal is classified. The only distinguishable additional costs of a classified terminal are maintenance of the crypto equipment and the monthly costs of the dedicated telephone lines that are necessary for classified terminals. We note that it may be less costly for non-local unclassified terminals to use a dedicated line, depending on connect time and distance from DTIC.

It can be concluded that the cost differences between classified and unclassified terminals are noticeable. Whether they are significant or not depends on the user's needs and attitudes toward achieving the desired result of complete data. As we have noted in Chapter IV, this result is currently unattainable anyway, even with a classified terminal, primarily because all the information that should be in the DTIC files is not there.

We note also that there are additional cost factors to DTIC (and to the DoD) in maintaining the classified DROLS. Among these are DTIC maintenance of crypto equipment, two remote offices (in Boston and Los Angeles for local classified users) and the non-optimum communications arrangements that ensue fromthe requirement for dedicated lines.

COSTS OF REMOTE TERMINALS

1969 CLASSIFIED (Ref.D-1)

One-Time Costs

KG-Crypto Unit	$ 3750 (GFE)
Junction Box	300
Telephone Installation	938
Site Preparation	3800
Allied Support	2636
Installation Team	1037
TOTAL	$12461

Monthly Operating Costs

Terminal	895
Modem Circuit	566
TOTAL	1461

IDA - 1980* CLASSIFIED

One Time Costs

Crypto Aux. Unit	$ 3000
KG 13-Crypto Unit	3448 (GFE)
Telephone Cable Ass'y	68
Installation	4000
Site Preparation	750
Safe (Including Shipping)	3050
TOTAL	$10868

Monthly Operating Costs (1980)

Maintenance	167
Telephone Line	181
Modem Lease	250
Terminal & Peripherals Lease	418
TOTAL	$1016

1980 UNCLASSIFIED SYSTEM

One-Time Costs
Installation $70

Monthly Operating Costs

Maintenance	145
Telephone (Time & Distance Dep.)	0
TOTAL	$145

*Although the IDA terminal was installed in 1979 as a classified terminal, we believe that these costs are reasonably close to actual 1980 costs.

REFERENCES FOR APPENDIX B

1. Richard K. Bennertz, *Development of the Defense Documentation Center Remote On-Line Retrieval System, Past, Present and Future,* Defense Documentation Center DDC AD-720 900, March 1971.

APPENDIX C

SURVEY OF DROLS USERS

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SURVEY OF DROLS USERS

As reported in Chapter V of this report, surveys were conducted at a total of eleven user sites, including IDA. In preparation for this survey, the survey questions were sent to the potential respondents in advance, along with some background information and a cover letter signed by the DTIC Administrator. This Appendix presents all this material in its original form except for the footnote on page C-7, which has been added here to indicate a change that we learned about after the survey had been completed.

DTIC-I

1 August 1980

Gentlemen:

As an effort to reassess and improve our technical information services, DTIC has contracted with the Institute for Defense Analyses (IDA) to help us evaluate possible ways to improve the overall effectiveness and efficiency of the Defense RDT&E On-Line System (DROLS). Your organization has been selected as part of a small sample of DROLS users from which to gather information about DROLS usage. Enclosed please find four copies of a questionnaire that IDA has prepared. We ask that you have three members of your organization's staff examine them. The three persons should be selected as follows:

a. A technical information services person familiar with DROLS.

b. A technical project manager who supervises bench-level personnel.

c. A bench-level technical person whom you know uses DROLS.

In a few days, an IDA staff member will contact you to conduct interviews of the individuals you have selected. The interview will focus on the questions in the enclosed, which are presented here so that you will have a preview of the scope of the questions and be able to do some preliminary thinking about the answers.

I would appreciate your cooperation in this matter and in assisting IDA to accomplish their assigned effort.

Sincerely,

Hubert E Sauter

HUBERT E. SAUTER
Administrator

1 Encl

QUESTIONNAIRE FOR DROLS USERS

I. INTRODUCTION

Under a contract with the Defense Technical Information Center (DTIC), the Institute for Defense Analyses (IDA) has been tasked with evaluating a possible change in the DTIC-operated Defense Research On-Line System (DROLS). Your facility accesses bibliographic information from DTIC. We have elected to query you about attitudes toward the use of DTIC services because you are among the heavier users of DROLS.

In the following paragraphs we shall describe several programmed changes in DROLS and then we shall describe a possible further change. We should like to have your comments on this change, in accordance with a set of questions that follows the descriptions.

II. PROGRAMMED CHANGES IN DROLS

Three changes in DROLS are to be implemented this year (1980). These changes will affect only users who have unclassified terminals. The first change, implemented in July 1980, permits the user of an unclassified terminal to access unclassified entries in the data file for technical reports.* That is, unclassified entries (the only classifiable fields in an entry are: titles, descriptors, identifiers, and abstracts)

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*While there are four files in DROLS, the examples of improved access are stated in terms of Technical Report file.

will become available to an unclassified terminal. About 90% of the Technical Reports and their entries are unclassified. Of the approximately 10% of the Technical Reports that are classified, 31% have completely unclassified entries. The latter, except for some abstracts which have limited distribution, will be fully accessible to an unclassified user. In other data banks, the proportion of classified citations (citations are the equivalents of Technical Report entries) is even lower than that of the Technical Reports, so an even higher proportion of these data banks is available to unclassified terminals.* If a classified report or entry (of which the existence has been determined by searching the technical Abstract Bulletin or DROLS) is wanted by a searcher, it can be requested on-line or by mail and it will be mailed by DTIC in an average of 3-4 days.**

The second change, to be implemented in October 1980, will be the initiation of a dial-up capability for any unclassified terminal user registered with DTIC. With this system the user can access DTIC with almost any type of terminal and telephone line or TYMNET. This change will reduce substantially the cost of accessing DROLS.

The third change, to be implemented in about November 1980, attempts to overcome a major deficiency in the first change noted above. All unclassified fields from a classified entry will be accessible to an unclassified DROLS user; that is, unclassified titles, descriptors, identifiers, and abstracts.

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*Access, similar to that to be made in July 1980 to the Technical Report File, is already available to the Work Unit and Program Planning Files. The IR&D file is accessible only to government personnel since it contains proprietary data.

**We made no estimate for the time required for delivery of registered U.S. mail and for the internal distribution of mail at the receiving organization.

Only certain limited distribution abstracts may not be available to all subscribers. For this planned change the classified user and terminal would perceive no difference from the current system.

Unclassified terminals would be capable of receiving relatively complete bibliographic information. We estimate that about 7% of the entries for all technical reports (69% of the entries for classified technical reports) will have from one to four fields (title, descriptors, identifiers, or abstracts) that will not be accessible to unclassified terminals. Nevertheless, a searcher at an unclassified terminal, in response to a subject search, would be provided at least an AD number, organization author, personal author, and report date. Therefore, such a searcher will know that a classified report exists that matches the inquiry. An exception to this exists: No find will be reported on-line if the searcher performs a subject search and the matching term in an entry is classified or is in a classified field.* If an unclassified terminal user wants a report or classified entry found by a search, it must be ordered for delivery by mail. If a comprehensive search including classified entries is wanted, an off-line bibliography must be ordered. Again, we emphasize that the information missing from the on-line system, in any case, is only bibliographic information. Reports or other documents must still be requested and delivered by mail.

Distribution limitations would still apply. Therefore, except for classification restrictions, almost all abstracts would be available to DoD users, fewer to other U.S. government users, and still fewer to DoD contractors, as is the case today.

*We have been informed by DTIC that this exception will no longer exist due to a modification planned to the system later this year. Unfortunately, we received this information after the survey was completed.

Hereafter, we shall refer to the DROLS with the above three changes as the "Baseline" System.

III. POSSIBLE CHANGE IN DROLS

The classified on-line component of the Baseline System would be discontinued.

The unclassified on-line component of the Baseline System would continue. Those title, identifier, or abstract fields that are classified would not be accessible. The descriptor field would be improved to contain all the posting terms (from the DRIT) that are applicable to the report so that subject searches would be more successful than searches from an unclassified terminal with the Baseline System. As in the Baseline System, if a user would want a classified entry it could be ordered for delivery by mail.

IV. QUESTIONNAIRE

We plan to visit or phone you for a personal interview at which time you will be asked to answer the questions orally. The purpose of this questionnaire is to give you some indication of the scope of the questions and to give you time to think about the answers.

1. Please identify yourself as:

    a. Information Specialist (e.g., librarian)
    b. Researcher
    c. Research manager

2. Estimate your use of DROLS over the last year

    a. Daily
    b. Weekly
    c. Monthly
    d. Yearly
    e. Never

3. What proportion of the documents (not books) in your collection is classified?

4. Have you used commercial on-line bibliographic services?

   a. Yes
   b. No

5. If you have only unclassified terminals, why do you not have a classified terminal? (Use as many answers as apply.)

   a. No need for classified information
   b. Little need for classified information
   c. Cost
   d. Terminal procurement difficulties
   e. Secure facility difficulties
   f. Necessary information is available in other ways
   g. Other (comment)

6. If you have a classified terminal, on what basis do you justify the additional expense and provisions over that for an unclassified terminal? (Use as many answers as apply.)

   a. Necessity for classified information
   b. Response speed for classified information
   c. Cost not a problem
   d. Terminal provisions not a problem
   e. Other (comment)

7. Would you consider changing your terminal to unclassified given the changes in DROLS programmed for 1980?

   a. Yes
   a. No

8. How was the capital (equipment) expense of your terminal(s) funded?

a. By our library
b. By our organization (not library)
c. Contract or Project
d. Other (How?)

9. Do you know how much it cost installed?

10. How is the operational expense of your terminal(s) funded?

a. By our library
b. By our organization (not library)
c. Contract or Project
d. Other (How?)

11. Do you know how much it costs?

12. If only unclassified service were provided, what would you most likely do about the missing classified fields (some titles, descriptors, identifiers, or abstracts)?

a. Nothing
b. Order the classified entries
c. Order the classified report

13. Referring to Question 12, on what basis would you take actions 12a, 12b, or 12c?

a. Ignore the report; inadequate information and too much delay in other options
b. Have enough information; no more needed
c. Require entry information to proceed
d. Might as well order report
e. Other (comment)

14. Would you be satisfied with an unclassified DROLS?

a. Strong yes
b. Moderate yes
c. Indifferent
d. Moderate no
e. Strong no

15. Why?

a. No strong need for classified bibliographic information
b. Need classified information, but can function adequately without classified DROLS
c. Cost of classified terminal is too high
d. Can use DTIC searches
e. Difficult to provide for classified terminal
f. Strong need for classified information
g. Classified search faster with classified terminal
h. Search more fruitful when performed in-house rather than by DTIC

16. What modification to DROLS (not discussed heretofore) do you think would be valuable?