AGARD-R-788

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ADVISORY GROUP FOR AEROSPACE RESEARCH & DEVELOPMENT
7 RUE ANCELLE 92200 NEUILLY SUR SEINE FRANCE

AGARD REPORT 788

Seminar on
Basic Documentation Practices
(Les Pratiques de Base en Matière de Documentation)

This material in this publication was assembled to support a Seminar under the sponsorship of the Technical Information Panel of AGARD and the Consultant and Exchange Programme of AGARD presented on 3rd—4th September 1992 in Ankara, Turkey, 7th—8th September 1992 in Athens, Greece and 10th—11th September 1992 in Lisbon, Portugal.

NORTH ATLANTIC TREATY ORGANIZATION

Published August 1992

Distribution and Availability on Back Cover

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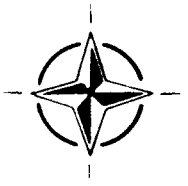

North Atlantic Treaty Organization
Organisation du Traité de l'Atlantique Nord

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- Recommending effective ways for the member nations to use their research and development capabilities for the common benefit of the NATO community;
- Providing scientific and technical advice and assistance to the Military Committee in the field of aerospace research and development (with particular regard to its military application);
- Continuously stimulating advances in the aerospace sciences relevant to strengthening the common defence posture;
- Improving the co-operation among member nations in aerospace research and development;
- Exchange of scientific and technical information;
- Providing assistance to member nations for the purpose of increasing their scientific and technical potential;
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Published August 1992

ISBN 92-835-0681-2

Printed by Specialised Printing Services Limited
40 Chigwell Lane, Loughton, Essex IG10 3TZ

Abstract

Application of new technology to the management of scientific and technical information relies upon a thorough grounding in basic concepts. The acquisition, storage, retrieval and dissemination of material is becoming ever more complex and is a process which requires an understanding of how knowledge is perceived by the end user, the mechanics of data transfer and the principles of responsible information exchange. In addition, the proliferation of information and the variety of media currently available make clear objectives and practical solutions essential.

The AGARD Technical Information Panel (TIP) has produced a number of publications aimed at establishing, and raising the standard of, information management. This Seminar brings together expert speakers to update the information in these publications and to contribute towards the further improvement in basic documentation practices.

This Seminar, sponsored by the Technical Information Panel of AGARD, has been implemented by the Consultant and Exchange Programme.

Abrégé

L'application des nouvelles technologies à la gestion des informations scientifiques et techniques passe par l'apprentissage des concepts de base en la matière.

Les operations de saisie, de stockage, de recherche et de diffusion des données deviennent de plus en plus compliquées, de sorte que le documentaliste cherche à comprendre la façon dont les connaissances sont perçues par l'utilisateur final, la mécanique du transfert des données et les principes de l'échange conscient des informations. Si l'on y rajoute la prolifération de l'information et la variété de ses formes, le besoin de trouver des solutions pratiques et de fixer des objectifs clairs devient manifeste.

Le Panel AGARD de l'information technique (TIP) a edité un certain nombre de publications dans le but d'établir des normes et d'améliorer les pratiques dans le domaine de la gestion des informations. Ce séminaire rassemble des conférenciers experts dont les contributions doivent permettre l'amélioration continue des pratiques de base en matière de documentation.

Ce seminaire est présenté par le Panel AGARD de l'information technique; et organisé dans le cadre du programme des consultants et des échanges.

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Contents

Introduction and Overview

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1. SUMMARY

The application of technology to the management of large volumes of scientific and technical information is founded upon basic concepts. The acquisition, storage, retrieval and dissemination of information is a complex process requiring an understanding of how knowledge is perceived, the mechanics of data transfer and the principles of responsible information exchange. Changes to the media currently available adds to the need for thorough grounding in basic documentation practices in order to apply technological solutions effectively.

As an introduction to the seminar this paper provides background and definitions relevant to the subject; identifies current and future trends; and presents an overview of the papers

2. INTRODUCTION

Inefficient handling of information wastes a fundamental resource. The collection and storage of records has long been recognized as a hallmark of civilization. However, recognition of the value and full exploitation of the information itself is a relatively recent development closely connected with the application of computers to traditional information handling activities.

"The historic function of librarianship has been to accumulate and maintain a record of human knowledge in a form which is uniform, ordered, economical and predictable in use as the complexity of the material will allow. A computer-based information system extends and elaborates what are essentially the same kinds of activities." (1)

With the application of new technology the role of the library/information centre is evolving from being a repository to providing one-stop access to a variety of information sources. This development is fragmented and uneven between countries, industries and organization structures.

AGARD, through the Technical Information Panel (TIP), has addressed these issues and attempted to standardize basic documentation practices through the publication of a Manual of Documentation Practices(2) and recent Specialist' Meetings in Turkey(3) and Greece(4).

3. BASIC DOCUMENTATION PRACTICES

This phrase is used to describe the techniques and procedures applied to material containing meaningful information which is used to provide some form of information service(s). These activities may include the initial set-up or subsequent operation of services derived from open literature or from unpublished sources. The emphasis is upon scientific and technical documents.

3.1 Basic

Use of the term 'basic' should not be confused with 'simple' or 'limited'. Rather, in this context, it refers to the principles upon which our information services are built; the concepts that form the foundation of the methods and organizations created to acquire, store, retrieve and exchange data.

3.2 Documentation

The AGARD glossary of documentation terms(5) defines a document as "A record in any form from which information may be derived...", and gives examples of: a page containing data, a graphic presentation, a tape recording, or a book. Today's examples may include floppy disks and CD-ROM reflecting the progress of technology in providing a variety of physical forms to present information.

3.3 Practices

This term is used to denote 'actions'. However, a British saying "practice makes perfect" rings a note of caution. The implication is that if an action is repeated often enough, it must be correct. This is not so. Activities may be distorted over time, bad habits arise and consequently the purpose of the exercise should remain in the forefront to ensure that the methods in use satisfy the requirements.

4. TRENDS

The volume of scientific knowledge and the rate of publication is such that computerization in some form is now considered to be essential to effective information services. According to the Information Market Observatory (IMO) quoted in Casey(6) real-time databases accounted for roughly 60% of the European information market in 1989, of which scientific and technical databases amounted to 12%. Predictions are for a threefold growth in the European Community (EC) online database market by 1996. However, this expansion is uneven (Table 1).

The general trend is for rapid, uneven growth in information products and services with a marked bias towards specific countries e.g UK. Predominance lies with public sector suppliers and bibliographic databases. It is now recognized that storage of vast volumes of data electronically does not of itself ensure effective use and that procurement of a computer will not necessarily heal all wounds(8).

Table 1
Database production: Europe 1988

Country	No of dbs	%EC
UK	325	34
Germany	194	20
France	119	13
Italy	94	10
Spain	78	8
Denmark	47	5
Netherlands	38	4
Commission EC	26	3
Belgium	22	2
Portugal	2	-
Ireland	2	-
Greece	-	-

Source: Lustac (7)

Market-led demand is the preferred criteria for information services rather than technology-led drive and the market requirements may be for technically unsophisticated, user-friendly products and services which meet real, practical, day-to-day information needs(9). As a result national policies are being developed on information handling and technology; mission statements supported by management are being implemented within organizations. Further investigation of how information is used is leading to the development of standards, guidelines on legal issues, quality control mechanisms, and the restructuring of the information and associated industries e.g. the telecommunications infrastructure.

4.1 Technological changes

One of the major pitfalls surrounding the application of new technology to the information field is the temptation to implement the latest development simply because it exists. It is not enough to make information available in machine readable form without ensuring that it will be accessible to the market. The identification and satisfaction of user needs is at the core of effective information services irrespective of pressure from without, whether it be to establish sophisticated information systems, link with a broad range of data sources or balance the budget. A focussed, specific marketing approach to information service provision is needed to fully exploit automation of information generation, storage and retrieval.

Marketing of this nature would also help to ensure that users have realistic expectations of computers and databases. Knowledgeable end-users do not expect the results of a search to be 100% comprehensive and have some understanding of the limitations of information systems. All too often there is insufficient preparation to existing systems (e.g. classification inconsistencies etc.) for retrospective conversion. Typical problem areas include: "lack of standardization of cataloguing and technical services, non-existence of a utility to provide machine-readable bibliographic records, different codes used by different libraries, lack of trained staff, lack of funds..."(10). Solving these problems often comes down to choosing between an off-the-shelf product or local development of appropriate software and systems i.e. reinventing the wheel.

4.2 User needs

"The primary responsibility of the librarian is to establish and maintain liaison with other department and division managers, to ascertain needs and evaluate trends, and to direct the work of the library so that it meets current needs and is prepared for changes in direction before they occur." (11)

User needs are central to the provision of all information services and provide the underlying reason for their existence. No single paper at this seminar covers the subject because it forms a thread running through all of the papers. In order to evaluate and modify services, user needs must be constantly re-examined, checked and reviewed. Answering the question of whether user needs are met results in judging the effectiveness of the information systems and services. This point is made in the Manual on the Evaluation of Information Centers and Services recently published by AGARD e.g. "...one can also determine the effectiveness of searching in terms of user satisfaction, amount of use, purpose of use and consequences of use on the users' work (i.e., users' productivity, quality and timeliness of work, etc.)."(12) This would include provision for potential users or those with only a partial awareness of their own needs.

4.3 Liability and responsibility

The concept of intellectual property applied to the provision of information is creating legal, contractual and professional precedents. The notion of intellectual property refers to copyright and authors' rights. Additional questions to address include data protection, contractual obligations and liability/negligence to end-users. A clash between national (and regional) concepts has already begun as a result of international data transfer and exchange. The AGARD TIP Lecture Series in 1991 on Intellectual Property Rights(13) covers the state of the art.

4.4 Quality

A corollary of the emphasis placed upon the legal position of information services meeting obligations and satisfying espectations is the stress laid upon quality assurance. In addition to the traditional requirements for quality in information work (e.g. accuracy, timeliness, specificity etc.), it is necessary to ensure that the computerized systems are of the required standard regarding hardware configuration, design and software applications. The ability to maintain quality levels is a consideration which may be seriously handicapped by information technology outstripping library housekeeping and information procedures in the changeover to automation. Quality is everybody's responsibility and involves agreeing measures of fitness for purpose; putting procedures in place to assure the quality of the end result; checking to see that staff follow them, and that customers are happy with the end result.

4.5 Restructuring of the information field

In all professions, qualified personnel keep themselves up to date in order to retain their expertise. The technological developments in the field of information work result in an atmosphere of change affecting the role of the intermediary.

Libraries and information centres are subject to economic forces and are affected by other areas of industry as they take their place in a market-led environment.

One of the more recent developments is the emergence of Document Image Processing (DIP) systems which is leading in some sectors to the integration of registries or records management activities with more traditional library and information services. In the defense environement the trend towards computer-aided acquisition and logistic support (CALS) is a deliberate initiative of the US government to enable the interchange of technical documents in digital form between the supplier and the user. When it is considered that a 9,000 ton cruiser carries 25 tons of documentation(14), one can understand why. The move towards both automated publishing and the paperless office is a gradual, remorseless process. Progress may be uneven and fall short of original optimistic targets, but partial implementation is inevitable. As a result there is increasing interrelation between connected fields e.g. communications. The application of information technology to areas such as tourism, transport, finance, business, medicine and law is creating an information-based society.

An aspect of the information field involved with these processes is the education and training of information professionals. The application of information systems to sophisticated library and information procedures is too important to be left to systems analysts alone. The evolution of computer-literate staff is vital to the future of documentation/information handling.

5. OVERVIEW OF LECTURES

This seminar will add to the ideas included in this introduction by presenting a current and comprehensive view of the state of the art. The speakers are drawn from government and from industry; from aerospace and from defence; from non-profit and profit-making organizations.

As the seminar is to be presented in Turkey, Greece and Portugal a paper from each host nation will first set the scene. Each of these papers addresses the issues of importance to the information profession within each country. Walter Blados will then develop the theme of planning and resource management.

Two papers on acquisition of material review traditional library/information materials (Chris Bigger) and technical support documentation (Russell Pool) respectively. Helmut Braun then develops the topic of document processing using examples from his own organization.

Technology is covered by Gladys Cotter (NASA) from online databases to networks to CD-ROM. A summary of information services is provided by Chris Bigger and the final paper advises on security risks and outlines methods to safeguard sensitive information.

The closing 'round table' discussion is intended to provide a forum for attendees to quiz the experts on general questions raised by the papers presented or specific problems from their own situations. It is hoped that the final publication will help to raise the standard of information management and contribute towards the further improvement in basic documentation practices.

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NATIONAL SCENE IN INFORMATION AND DOCUMENTATION ACTIVITIES AND RECENT DEVELOPMENTS IN THE DOCUMENTATION CENTER OF TÜBİTAK (TÜRDOK)

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SUMMARY
The first part of this paper is based on the evaluation of the survey, conducted by the Documentation Center (TÜRDOK) of Scientific and Technical Research Council of Turkey (TÜBİTAK) on the existing national information and documentation activities in Turkey. The second part of the paper comprises the recent developments of TÜRDOK in providing information for universities, governmental institutions and industry.

PART 1: NATIONAL SCENE

In September 1991, The Documentation Center of TÜBİTAK (TÜRDOK) has initiated a nationwide survey in order to determine and evaluate the existing level of national information and documentation activities in Turkey. The survey has covered all types of organizations in various sectors, namely, government, industry, academic institutions, professional organizations and societies and international or foreign organizations located in Turkey.

The data is collected by interviewing and by a mail surveying.The questionnaire is designed to possess awareness about the organizations and their information/documentation(I/D) activities in four major areas:

- General information concerning the particular unit (I/D), i.e., the type of organization, primary function of the organization, subject area of interest.
- Information sources and facilities, i.e., type of services and products thatare offered, how they are being used and who were their target users.
- Existing technology and equipments of the unit.
- Personnel and budget.

As of May 15th, 1992, 94 organizations have responded to our survey questionnaire. 22 of which are eliminated because of irrelevance. 50% of these organizations are located in Ankara 18% in İstanbul, 6% in İzmir and the rest are distributed in various sections of the country from West to East, especially in the regions where the universities and industry are located. The main reason of the highest response rate from Ankara might be due to the collection of the data by interviewing and the presence of most of the governmental organization centers in the capital city.

The sectoral classification of the units are determined by the evaluation of the organizational affiliations. According to the data 40.28% of the I/D units belonged to governmental organizations, 37.5% to academic institutions, 5.6% to private sectors and 16.6% were part of the other sectors which included the professional organizations and societies and the international or foreign organizations or agencies located in Turkey.

The subject field of interest differed according to sectors. In general the services of the 34.72% of the units covered all fields of sciences. The percentage of the other subject fields of interest distributed among the units are as follows:

36.00% Engineering and Technology,
31.00% Social Sciences and Humanities,
16.60% Natural Sciences,
12.50% Medical Sciences,
8.72% Agricultural Sciences and
9.72% Specific subjects other than the ones mentioned above.

The types of information institutions covered during the collection of data were evaluated with respect to their functions and activities. 50-52% of these units defined themselves as information and/or documentation centers. 75% of the units have libraries of various sizes, 11% could be considered as data centers which only provide and handle the numerical data, 6.9% were information analysis centers which collect, analyze and disseminate the data and 13.9% had only a library that provide and facilitate the use of their collection by specific users or by students or teachers in universities or other institutions.

29.17% of these I/D units are capable of producing their own databases. Most of these databases are used for the in-house activities while some of them are used to provide information to users from other institutions.

The number of organizations which defined themselves as information and/or documentation centers is 38. Most of these centers provide information to users either by on-line or CD-ROM access and/or by library facilities. 26.39% of these centers have on-line access to various databases from 24 different foreign information centers. Among these centers the DIALOG Information Services Inc. is the most

widely used one. The percentages of the use of some of the information centers are as follows:

52.63% DIALOG Information Services Inc.,USA
31.58% STN International,Germany
26.32% ORBIT Search Services,USA
21.05% PFDS,UK
21.05% DATA-STAR,Switzerland
21.05% ESA-IRS,Italy
16.00% BRS Information Technologies,USA
16.00% ECHO,EC
10.50-5.50% other centers.

41.66% of I.D units provide information by accessing CD-ROM databases with 43 different titles. The fields of subjects of the CD-ROM databases differed according to organizational affiliations and their aims. The most widely used CD-ROM database is MEDLINE which is carried by 56.66% of these units.The percentage of the use of some CD-ROM databases are as follows:

56.66% MEDLINE
23.33% Science Citation Index
23.33% ERIC
20.00% CABCD
13.33% BOOKBANK
10.00% BiblioFile
10.00% Books In Print
10.00% Compendex Plus
10.00% NTIS
6.66-3.33% others

75% of the I.D units have libraries. The sizes and the holdings of the libraries differed according to the type, size and the affiliation of the organizations. 72.4% of these libraries have holdings of 1 to 50000 and 5.2% have between 300000 to 900000 volumes of books. 24.07% have subscription of 1 to 100 titles and 22.22% have subscription of more than 1000 titles of periodicals and serials. The rest have holdings between these ranges.

The total number of personnel working in these centers is 1342. In general 36% of these are professionnals (librarians, technicians or subject specialists) and 64% are non-professionals and auxillary personnel. The distribution of the professional personnel varies according to the sectors. The percentage of professionals is 60% in private sector, 23% in universities and 45% in governmental organizations.

The survey is still continuing.At the end of the survey a final report will be prepared as well as The Directory of National Information/Documentation Units.It is expected that the products of the survey will serve to optimize the use of present facilities.Furthermore, it will help to start up the urgently needed cooperation and coordination among the units.

PART 2: THE RECENT DEVELOPMENTS IN TÜRDOK

The Documentation Center (TÜRDOK) of the Scientific and Technical Research Council of Turkey (TÜBİTAK) was established in 1966. Main aims of the Center were to provide scientific and technical information and documentation services for the scientists from universities, governmental institutions and industry and to promote and encourage the necessary coordinations in developing information systems and services troughout the country. To achieve these, the services of TÜRDOK are carried out by two main units: The Information Services and Library and Document Supply.

Since 1984 the information needs of scientists, researchers and technicians from universities, governmental institutions and industry are provided on-line by accessing databases at various information centers throughout the world. The annual average of the information search request for the years of 1985 to 1991, was 2224. 84.6 % of these requests were received from universities, 7.3% from governmental organizations and 8.1% from private sector. The original documents are also ordered on-line from various document supplying units troughout the world. The annual average number of requests were 999 and the number of documents supplied were 5300 for the same period of years mentioned above.The 60.81% of these requests came from universities, 27.12% from private sector and 6.76% from governmental organizations.

In order to provide an effective and efficient delivery of the services, an electronic-mail system was put into service in 1991. Any requestor who has an accesss to EARN (European Academic Research Network) or PTT-TURPAK (Packet Switching Network) can forward his request to TÜRDOK and collect the result in a reasonable period of time.

The design and the construction of the National Scientific and Technological and Medical databases were also completed in 1991. The data input was started in February, 1992. These are two bibliographic databases, the one covering scientific and technical information and the other covering the medical information collected from journals and serials, conference proceedings, technical reports and non-periodicals published in Turkey. VAX/VMS version of the BRS Information Retrieval software and JICST (Japon Information Center of Science and Technology) Thesaurus and MESH (Medical Subject Headings) indexing tools were used in the processing of data. The database records consist of Turkish and English descriptors, identifiers and titles, author, publication type ,publication date and place, document type, document number, accession number and references. Abstract is not included for the present. Approximately 15000 references are expected to be processed annually.

In 1991, CD-ROM databases were also made available as an additional information retrieval media. Currently SCI, Medline, CAB, Compendex-Plus, NTIS, POLTOX-1,

ABI/INFORM, Thomas register, ERIC and Education Library CD-ROM databases are at the use of requestors.

Our first workstation for accessing the existing CD-ROM's was a Hitachi single drive unit and an IBM-compatible PC located on the system-room where the on-line workstations were located previously. Since the single drive unit would not be efficient to access these databases we have acquired local area network to run CD-ROM's as well as to access on-line databases from various information centers.

In order to select the proper configuration of the network it was very important to develop a picture of the nature of center that takes into account existing equipment and needs of users. As a start we have chosen a fairly large system, designed to provide ten or more CD-ROM databases to ten or twelve PC's or workstations located in the room of each subject specialist. The network may also be used for non CD-ROM applications, i.e., on-line access of information centers, in-house operations. In addition to these, compatibility with other existing computer systems and possibility of further expansion were also important factors to take into account.

There were a number of manufacturers marketing different CD-ROM network components. To avoid problems concerning the usage of the existing CD-ROM databases and the PC's, we have tried to choose one product with a complete turnkey system which includes hardwares, softwares, installation, training and maintanence. MultiPlatter system developed by SilverPlatter Information Ltd. claimed to have a good quality of physical and logical connections as well as the simplicity in usage, monitoring and security capabilities. They also offered training and technical support until the system was fully established. In August 1991 we have come to an agreement with SilverPlatter Information Ltd. through the assistance of INFO-Technology Supply Ltd. to purchase the MultiPlatter System with the hardware configuration of CBIS Network Server with 4MB RAM which accomodates 21 CD-ROM drives, that is CD-Towers each containing seven CD-ROM drives. The system has also included network interface cards and cables and various search and retrieval softwares. Twelve PC's with 1.5 MB RAM and 40 MB hard disk and two very fast dot-matrix system printers already existed in our center. In February 1992 the system was installed by the technical staff of both INFO-Technology Supply and TÜBİTAK-TÜRDOK.

The Advantages of the System

In the long run it is much cheaper and easier to use.

It allows multi-user access to each disk from any of the twelve workstations connected to the network.

It eliminates the need for multiple software installation and updates. A dedicated network file server located in the system-room would enable each workstation to load a copy of the search software from the server.

It provides security for the CD-ROM disks by housing them in the network drive-towers located in the system-room. Since only the system manager changes the disks, loosing, scratching, staining and damaging of the disks are avoided. The system server and drive-towers are located in a non-public area. This way environmental protection from smoke, dust and high temperature is provided.

The system presents the menu to the users. The user chooses the database from the menu. After typing the search strategy the front-end software searches the CD-ROM databases.

It allows other network software packages to be run along with the CD-ROM search software.

With the addition of a modem to the system on-line access to various data centers is provided from each workstation.

The system permits the further expandibility and wide area networking through modem server if required.

By assigning password to each workstation it is possible to keep record of usage, i.e, how many users had access to the particular database and how long the database was searched. This information can be obtained on a daily, weekly, monthly or a yearly basis.

The system compiles to Ethernet standards which enables connection of different types of computers into the network.

The Disadvantages of the System

It takes time to plan and implement the system.

The initial set-up costs are quite high. Additional expenses like PC's, fast printers and cables are necessary. Network licenses are very expensive.

It requires training and demonstration to teach the usage of the system.

It requires a great level of technical expertise and support for the maintenance of the system.

A system manager is absolutely necessary to start up and shut down the system, to diagnose the errors, to install the software updates, to change the disks, to control the system continuously, to solve the in-house managerial problems.

Almost everyday something unexpected occurs in the system. The system blocks out, one or two PC's show error, cables cause problems, softwares get infected with a virus, finding enough RAM at the workstation may become ennoying and so on. At the end of one month of frustration the network seems to be functioning fully and smoothly right now.

DOCUMENTATION PRACTICES: THE NATIONAL SCENE (GREECE)

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GREECE

SUMMARY

The information "explosion" combined with the capabilities offered by the new technologies poses a new challenge to all those involved in documentation work: producers, librarians, documentation and information specialists, and users. This paper presents an overview of current documentation practices in Greece. It also addresses subjects associated with documentation work, such as standards, telecommunications networks, education and training, and library automation issues. It outlines the progress made in some areas during the recent years and attempts to identify the major problems related to the delayed implementation of modern means and practices in the Greek documentation environment.

LIST OF ACRONYMS

EKT: (Greek) National Documentation Center
ELKEPA: Greek Center for Productivity
ELOT: Greek Organization for Standardization
EOMMEX: Hellenic Organization of Small and Medium-Sized Industries and Handicrafts
GCL: Greek Command Language
IGME: Institute of Geology and Mineral Exploration
OBI: Organization for Industrial Property
OTE: Greek Organization for Telecommunications
TEE: Technical Chamber of Greece

1. INTRODUCTION

Just the mere fact that the terms "library" and "librarian" are even today by far more commonly used in Greece than the terms "documentation center", "information center", or "information specialist", suffices to indicate that, despite ongoing development, the modernization of libraries remains a goal for the future - the near future, we, librarians, hope.

In 1988, during an AGARD Specialists' Meeting held in Athens, two papers were presented describing the situation in the documentation and information scene in Greece, both in the academic/scientific and the defense community.

It is true that most of the problems which were identified at that time as reasons for the malfunctioning of libraries still remain unsolved: the majority of libraries still operate with very small -if any- budgets, limited and inadequate space allocations, old -if not obsolete- equipment and, usually, lacking support from their parent organizations. They are generally looked upon as "nice-to-have" but not rarely even as money-devouring, no-profit-making activities. Yet, many libraries are undergoing significant changes.

As the Greek librarians and information specialists become more aware of international developments in documentation practices, and with the European Economic Community pushing for modernization in information services

and making funds available to this purpose, new technologies and techniques are being implemented in libraries. Although it is not very widely known, AGARD has also been playing a very significant role in this mutation process. Through its Technical Information Panel (TIP), AGARD is offering under the Support Program its assistance for the development of documentation and information services in the Hellenic Air Force (Air War College/ Scientific Library). A forthcoming AGARD consultancy mission is expected to help set the ground for a long-term cooperation between the Air War College Scientific Library and a foreign Defense Information/ Documentation Center.

Often modernization is accelerated or even induced in Greek libraries by external factors, such as information providers. An example for this is the replacement of publications in printed form by CD-ROMs, which prompted acquisition of new equipment and modification of work practices. To be able to handle this type of material, libraries had to procure the necessary hardware and train their staff in new searching techniques.

2. STANDARDS

The long absence of documentation standards combined with the peculiarity of the Greek alphabet and language has often led many Greek librarians, documentation specialists and publishers to confusion and frustration.

2.1 ELOT's Profile

In 1979 the Greek Organization for Standardization (ELOT) was founded as the only legal producer of Greek standards and regulations. ELOT establishes and publishes standards, certifies products, represents Greece in various international and European standards organizations (ISO, IEC, CEN, CENELEC) and is the main supplier in Greece for all Greek and foreign standards and specifications. To establish widely accepted standards, ELOT cooperates with the Greek producers, consumers, scientists, traders and the Public Administration. Additionally, ELOT offers access to ISONET, the international information network on standardization, to enterprises and services of the public and private sector.

2.2 ELOT and Documentation Standards

With the rapidly increasing amount of information generated universally and the new possibilities for information exchange offered today both by the technological evolution and by the recent changes in the international political scene, it becomes evident that the establishment of appropriate standards is a necessity. Because, not only will standards allow information transfer; they will, at the same time, enable libraries and documentation centers to share resources and to avoid duplication of time-consuming and costly operations.

Having recognized this need, ELOT appointed a standing committee, **Technical Committee TE22**, to which the establishment of documentation standards was assigned.

The majority of the ELOT documentation standards relate to ISO standards either by equivalence or by relevance. Annex A-1 presents an up-to-date listing of these standards. A review of their titles reveals that for many essential areas of documentation work no standard has been published yet. This is due partly to ELOT's long dormant situation in the past, but it is also connected with very complex matters of general and national policy. For example, no decision has yet been made on the establishment of a uniform international name for our country. Is it going to be ELLAS -former HELLAS - or GREECE? It is very obvious that ambiguities like this one can create much confusion not only among Greek but also among foreign documentation producers and users.

There are five more committees and working groups within ELOT dealing with documentation related issues:

- the Technical Terminology Committee (TE21)
- the Chemical Terminology Committee (TE36)
- the Medical Terminology Committee (TE42)
- the Information Science & Technology Terminology Working Group under the Electronic Data Processing Committee (TE48)
- the Special Committee for the Transliteration of the Alphabet (EE5)

3. BIBLIOGRAPHIC CATALOGS

3.1 The Greek National Bibliography

This vital tool, extensively used in many nations by libraries and documentation centers, has been missing from the Greek documentation scene until very recently. Although the legislative framework has been in existence since 1943 (the Greek deposit law 880/1943 requires that two copies of every work published in Greece be deposited with the National Library), various problems refrained the Greek National Library from assuming and fulfilling one of its main tasks: the compilation and publication of the Greek National Bibliography.

In 1989, as the pressure both from librarians, documentalists, publishers, booksellers and from national and international organizations grows, and as some of the problems start being resolved, the National Library proceeds with this project. The **first volume** of the Greek National Bibliography, **published in 1990**, contains all publications deposited during 1989. The volume consists of two parts:

- the Classified Listing of Bibliographic Records

- the Indexes

In the first part the entries are listed in sequence according to their Dewey Decimal Classification number. The descriptive cataloguing is based on the Anglo-American Cataloguing Rules (AACR2). The Greek subject headings, established by the National Library's Cataloguing Department, are mainly derived from the Library of Congress Subject Headings but also from other subject catalogs. The second part of the volume contains five indexes arranged by

- author, title and series
- subject
- publisher
- ISBN
- year of publication

There are two issues of the Greek National Bibliography published per year. The first one covers the publications deposited with the National Library during the first six months of the year. The second one is a cumulative volume and covers the publications of the whole year. The cumulative volumes for 1989 and 1990 have already been published and contain 3408 and 3255 bibliographic records respectively, whereas the publication of the cumulative volume for 1991 is in process.

Not included, for the time being, in the Greek National Bibliography are new or changed titles of periodicals and journals, publications which are comprised of less than 16 pages and reports of research and similar activities.

Recently the National Library was assigned the role of the national monitor for ISBN and ISDS numbers. This will certainly enable it to gain a more thorough picture of current local production.

3.2 Bulletin of Greek Bibliography

In parallel to the National Library, the Panhellenic Publishers' Association launched in 1991 the publication of a quarterly bulletin, the "Bulletin of Greek Bibliography" which contains the works of Greek authors deposited by the Association's members with the National Library.

4. TELECOMMUNICATIONS NETWORKS

The country's telecommunications infrastructures and services are currently undergoing major changes towards their long overdue modernization. These changes were mainly prompted by an EEC crash-program for 1991-1993 which will prepare the ground for the creation of a single European telecommunications area by eliminating regional problems and disparities in the telecommunications system.

OTE, the Greek Organization for Telecommunications, operates under the control of the Greek Ministry of Transport and Communications, is a profit-making organization and plays a dual role in Greek telecommunications: **OTE is both a regulator and the only operator**. As such, OTE has the telecommunications monopoly in Greece, **contravening** current **EEC** regulatory **provisions** according to which the regulatory body must differ from the the operator(s). In 1987 Greece signed the so-called "Green Paper" based on which certain telecommunication services will have to be liberalized and deregulated. OTE will maintain the exclusive rights for voice telephony but mobile telecommunications, private networks, paging and satellite services require liberalization.

Already, new services called Value Added Network Services (VANS) have been developed or are under development, such as HELLASPAC and the Directory Assistance.

HELLASPAC, an evolution of HELPAC, is an X.25 Packet Switched Data Network and became operational in January 1990. It is exclusively used for data transmission in speeds up to 64 kbps, and it is accessible on a distance independent, local call basis from anywhere in Greece. While HELPAC provided access to foreign hosts through concentration of the telephone calls on a leased line to TRANSPAC (the French network), HELLASPAC is now offering telecommunication capability between its Greek users. It will support teletex, EFT, POS, e-mail, videotex and electronic catalog. **Eight node-exchanges** are installed in eight cities: Athens, Pireaus, Salonica, Patras, Tripolis, Kavala, Larissa and Heraklio.

Also for data transmission OTE offers leased lines of quality M1020, M1025 and M1040 for speeds up to 19,2 kbps. The charge is fixed and depends on the distance between the end-points. The Public Switched Telephone Network (PSTN) can also be used for data transmission in a dial-up mode for speeds up to 4,8 kbps. The charge depends on the duration of the connection and on the distance.

Recently it was announced that OTE is negotiating with two companies (IBM and InfoNet) the framework of an agreement under which OTE will provide to Greek subscribers electronic mail capabilities and access to international databases through these companies' private networks.

5. GREEK DATABASES, GREEK HOSTS AND INTERMEDIARIES

In the Greek information environment printed paper prevails as the medium for the storage and supply of information. There are **three** main **obstacles** for the development of commercially available Greek databases:

- the **small**, although rapidly growing, domestic **market size**
- the competition from **"free" information**
- the **language barrier** and language restricted external market.

Despite above limitations a number of databases were developed in recent years mainly in the public but also in the private sector. The majority of them were intended and designed for in-house use only. Annex A-2 lists the most widely known Greek databases offering public access. Information on their producers, on the area

of their development (public or private sector) and on the way they can be accessed is also provided. The contents of each database is described below:

1. PERIODIKA:
An inventory of periodicals which are located in more than 80 Greek academic and research libraries; it contains approximately 16,000 titles and provides information on their location and completeness (holdings). Online document order and delivery capability is also provided to the user. A sub-product of this database is the Union List of Periodicals in the form of a printed catalog.
2. BIBI:
Produced by the Greek Center for Medical Information, Terminology and Documentation (IATROTEK) this bilingual (Greek and English) bibliographic database covers the Greek biomedical bibliography after 1980. It contains references to about 10.000 articles published in 60 Greek biomedical journals from 1981 until today. For the articles published after 1983 an abstract is also included in the reference.
3. DISSERTATIONS:
A Greek dissertations index, containing about 2.000 references (in Greek and English) to doctoral theses since 1987.
4. ORP:
An inventory of ongoing Greek research projects containing over 2.500 records.
5. TEE:
A bibliographic database of Greek engineering literature (articles, monographs, scientific papers); it contains close to 2.000 references.
6. IGME:
A bibliographic database on geomineral studies with 1.000 references to articles, studies and reports published by the Institute of Geology and Mineral Exploration.
7. ICONE:
A bibliographic database containing information on all international, European and Greek standards and their correlation; the subjects and titles can be searched in English, French and German.
8. MPOTSI:
A referential database containing MPOTSI'S publications (periodicals, newspapers, etc.)
9. URSA-dis:
A bibliographic database containing about 2.500 papers on regional planning and development of Greek regions; its producer is the Department of Urban Studies, Polytechnic School of University of Patras.
10. SOCI:
A bibliographical database covering Greek publications on social studies.
11. HELLASLEX:
Produced by HELLASLEX under the auspices of the Athens Bar Association this database contains references to more than 100.000 legislative documents and court decisions; it covers the years 1975- today and it is already being accessed on-line by 22 regional Bar Associations and 500 individual subscribers.
12. COMPUPRESS:
A referential databank on COMPUPRESS' periodical publications.
13. KAPA-TEL:
A non-bibliographic database containing national and international political and financial news, press reviews, information on public services, banking, EEC funded programs, the tax legislation, tenders and contracts in Greece and data from the Greek Stock-Exchange; a new videotex application.

In addition to these, EKT has developed a database containing approximately 15.000 records on Greek patents. After 1990 the management and maintenance of this database came under the responsibility of the Organization for Industrial Property (OBI).

OBI, a non-profit organization in the public sector, is the exclusive supplier of information services in the area of patents. OBI's future plans include access to international databanks through HELLASPAC, and the establishment of an Information and Documentation Center through which primary and secondary information will be disseminated.

The use of the databases mentioned above is offered at very low, often below-cost prices, or even free of charge. Free on-line access via the public data telecommunications network is provided to the first six databases through EKT (acting as host). Users from the academic and research institutions can access them by linking to the ARIADNE net.

The dissemination of information extruded from the databases is generally in printed form, as is the vast majority of all Greek primary publications.

With the commercial implementation of HELLASPAC two new types of electronic online information services appeared in the Greek market: videotex online applications and development of online accessible referential and source databanks. HELLASLEX and KAPA-TEL are two examples. They can be accessed on a subscription basis.

To develop, manage and retrieve information from databases, adequate software is required. Faced with the fact that the Greek language encumbers the conversion of foreign readily available software packages, many Greek database producers chose to also produce their own software. EKT has designed and developed special software for on-line database management able to handle the Greek and Latin character sets. The Common Command Language (CCL) and its Greek "extension", the **Greek Command Language (GCL)**, have been selected to be the retrieval languages.

In their effort to respond to their users' growing requirement for access to literature from worldwide sources, more and more Greek libraries, documentation and information centers are assuming the role of intermediaries to international hosts. Among the more active ones are: the National Documentation Center (EKT), the TEE Documentation and Information Center, the ELKEPA Library, the EOMMEX Documentation Department, ELOT, the Ministry of Agriculture Documentation Department and a number of University Libraries.

6. EDUCATION AND TRAINING

6.1 Information/Documentation Professionals

Studies -undergraduate or graduate- in Library Science are not included in any of the Greek universities' programs. There are two Schools of Library Science operating within the Technological Educational Institutes (TEI) in Athens and Salonica, but the degrees granted are not recognized as equivalent to a Bachelor's degree. The students graduate after three years of theoretical studies (courses) and six months of practical on-the-job training. They are accepted, under certain conditions, as second-semester students in the Greek universities, this meaning that a total of seven years of undergraduate studies is required before a TEI student can start graduate work.

The *Ministry of Education* is presently considering the re-structuring of the TEI system as a whole, but no concrete plans have been announced to the public yet. In the meantime, the Greek Librarians' Association organizes, in collaboration with various institutions such as ELKEPA and EOMMEX conferences, seminars and workshops for documentation professionals aiming to inform them on new technological developments and new products affecting their work, and to create current awareness on new international trends in the documentation/information field.

6.2 Information/Documentation Users

There is general very little activity in Greek libraries and documentation centers regarding the training of their users. Very seldom seem the latter ones to be aware of the various information services and sources available.

EKT, in its multiple role as host, database producer and information

provider is scheduling familiarization programs for documentation professionals, information specialists, intermediaries, TEI students and end - users.

7. LIBRARY FUNCTIONS AND AUTOMATION

Coming from an industrial establishment, I prefer to use the terms "direct" and "indirect" to describe the different library functions. As "direct" I perceive all those functions which relate directly to services provided to the library users. Referral and information services, interlibrary loans, announcement services, photocopying and translation services would come under this category.

As "indirect" I perceive all those functions which are performed in libraries, usually unnoticed by the users, to build the services for them. Document selection, procurement and storage, bibliographic processing of documents, data management, storage and security, library management support functions (e.g. statistics, staff training, publicity, accounting) can be described as "indirect" functions.

7.1 Automated Documentation/ Information Practices

The volume of holdings in most Greek collections alone would certainly convince no-one of the necessity for automation of library operations. Most of them are rather small with a very low growth rate. It is exactly this fact that created the need to improve traceability of in-house information, to access external information sources and to share resources which, in turn, led a number of libraries to automation.

Based on a survey conducted during the last quarter of 1989, **library automation in Greece has been mostly implemented by special and academic libraries**, which constitute the leading area, while public libraries are weak and school libraries almost nonexistent.

Unfortunately, cases where lack of related previous experience, sufficient funding and/or adequate planning led to long periods of stagnation or even to gradual deterioration of the automation process are not rare.

There are many turnkey software packages commercially available in the Greek market for the automation of library operations, among which some produced by local software houses. Also, some libraries have designed their in-house software. The result in many cases indicates the lack of experience of the systems analysts with libraries and of the librarians with computer systems. Most automation has been done in isolation without taking into account future requirements for the exchange of bibliographic data between libraries.

To circumvent this problem, the National Documentation Center has developed **ABEKT**, a software package for microcomputers. ABEKT is offered free-of-charge to libraries and documentation centers of the public sector. It can be used for book-in-hand cataloguing and is based on ISO 2709. ABEKT also supports exchange of data in UNIMARC and CCF formats both in Greek and Latin characters. To-date ABEKT has been distributed to over 80 Greek libraries. An ongoing survey by EKT will collect data on its utilization and comments on its effectiveness and adequacy.

On the other hand, the University of Crete/Institute for Technology Research has developed **PTOLEMEOS-II**, a multiuser modular information system for libraries. Based on MARC, AACR2 and ISBD and using SQL it supports circulation and interlibrary loans, cataloguing, acquisitions, serials control and the development of an OPAC both in Greek and English language.

Generally, the locally accessed On-Line-Public-Access-Catalog (OPAC), the serials control system, circulation

and abstracting/indexing seem to be the most commonly used applications of library information systems in Greece. However, due to

a) the complexity of current information retrieval methodology,
b) the lack of sufficient number of installed terminals, and
c) lack of the end-user's education,

OPACs are usually accessed by the librarians acting as intermediaries, and only the printed catalogs are directly consulted by the users.

7.2 "Indirect" Library Functions

The **selection and procurement** of new material is an extremely time-consuming task for the Greek librarian. There are no specialized journals, such as "Choice" and "ASLIB Booklist", published in Greece to assist him in his work. In order to enrich the library collection with Greek publications the acquisitions librarian usually visits bookstores and book exhibitions and reads through announcements and book reviews published in magazines, daily newspapers, publishers' catalogs and bibliographic bulletins. Not rarely the inconsistencies between all these various publications result in duplicate orders. It should also be mentioned that, to my knowledge, most of the existing sources are incomplete as to the data they provide: information on price, readers' age group and education level addressed, and commentaries are often missing. The lack of a Greek Books-in-Print and -out-of-Print makes the identification of currently available publications on a specific subject a burdensome task and does not allow realistic budget planning for new acquisitions.

The recent publication of the Greek National Bibliography and of the "Bulletin of Greek Bibliography" as described in paragraphs 3.1 and 3.2, may solve the problem to a certain extend.

In the area of "grey" literature the situation, of course, is even more complex. With few exceptions, scientific and technical papers and research reports remain dispersed in the originating university departments' and research labs' registries and files, never reaching the desk of a documentation specialist or the shelf of a library.

The actual procurement process is even more time-consuming than selection, because of bureaucracy and absence of Greek book dealers.

Every library in Greece does its own **cataloguing, abstracting and indexing**, at least in regard to Greek publications, following different rules and standards, and duplicating an effort that could have been easily shared with other libraries on a collaborative arrangement. Original cataloguing is almost always required, due to lack of a union catalog of Greek libraries, containing bibliographic records. Therefore, the National Bibliography is expected to be of great value also in this process, at least for the current publications. However, the gap remains for the pre-1989 publications.

For foreign publications a variety of sources for cataloguing data is consulted. Few libraries, such as the Aristotelian University of Salonica Library and the University of Crete Library, use LC cataloguing data either though online access to OCLC Europe, from CD-ROMs or from LC MARC tapes. Today, OCLC contains about 40.000 bibliographic references to Greek publications. However, the use of Latin characters in these references presents a problem that will have to be considered.

7.3 "Direct" Library Functions

The most frequent users of **information and library services** come from the public sector and the academic community. There is also a number of small groups from the private sector requiring specialized information: doctors, lawyers, the press. In general, centers with access to foreign databases offer also online document

ordering and delivery services. But **Current Awareness or Selective Dissemination of Information (SDI) services**, computer-based or by any other method, are very rarely provided.

The same applies also to **interlibrary loan** which often means informal, on-a - personal - acquaintance - between - librarians based exchange of documents, or even sending the user with a note to another library. The union catalog of periodicals, which is produced by EKT and distributed both in printed and electronic format, is expected to enhance interlibrary loan services to the advantage of the users and the libraries themselves.

A survey conducted five years ago showed that only 6% of the Greek users of information, especially in the area of STI, believe that they don't miss information because of language barriers. Despite of this, only about 2% of the libraries offer **translation services.**

8. CONCLUSION

"New technologies and Greek libraries don't seem to get along too well". This assertion was made by the Greek Librarians' Association delegate during a Librarians' Conference in Athens, in 1990. The management and staffing of libraries, the librarians'education and training, and the cooperation and collaboration between libraries were pin-pointed as some of the main problem areas and attributed to the lack of an adequate national information policy and of standards and to the absence of sufficient support.

There has been considerable progress made during the last two years, but a lot remains still to be done; not to prepare for the future, but to simply catch-up with the past and be able to follow the present. And although it is commonly accepted that today's fastest vehicle to Europe and the world is information, Greek libraries and information centers don't seem to have convinced either their sponsors of their users of its value. It can be argued that Greece has still major problems to solve in areas like education, public administration and public health. But we all must remember that efficient information systems are tools which in themselves promote the development of a nation.

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4. [New Technologies and Greek Libraries], Proceedings of the 6th Panhellenic Conference of Librarians, Athens, Greece, 1990.

GREEK DOCUMENTATION STANDARDS

ELOT 367 : Documentation - Card Catalogs - Card Dimensions

ELOT 371 : Documentation - International Standard Book Numbering (ISBN) (ISO 2108: 1978)

ELOT 414 : Documentation - Abstracts for publications and documentation (ISO 214: 1976)

ELOT 560 : Documentation - Bibliographical references - Content: form and structure (ISO 960: 1987)

ELOT 633 : Documentation - Format for bibliographic information interchange on magnetic tape (ISO 2709: 1981)

ELOT 676 : Documentation - Title leaves of a book (ISO 1086: 1975)

ELOT 719 : Documentation - ISBD(M) Greek translation and adaptation of ISO/DIS 5962 on the international standard bibliographic description of monographs

ELOT 720 : Documentation - Abstract sheets in serial publications (ISO 5122: 1979)

ELOT 822 : Documentation - Bibliographical references - Aobreviations of typical words (ISO 832: 1975)

ELOT 928 : Documentation and Information - Greek character set - 8-bit code

ELOT 1110 : Documentation - Numbering of divisions and sub-divisions in written documents (ISO 2145: 1978)

ELOT 1200 : Documentation and Information - Three-letter abbreviations (labels) for the tagging of fields and sub-fields in bibliographic records of monographs

ELOT 1211 : Documentation - Rules for the abbreviation of title words and titles of publications (ISO 4: 1984)

ELOT 1212 : Documentation - Contents list of periodicals (ISO 18: 1981)

ELOT 1213 : Documentation - Index of a publication (ISO 999: 1975)

ELOT 1312 : Documentation - Methods for examining documents, determining their subjects and selecting indexing terms (ISO 5963: 1985)

ELOT DRAFT : Documentation - Guidelines for the establishment and development of monolingual thesauri (ISO 2788 : 1986)

GREEK DATABASES

S/N	LABEL	PRODUCER	SECTOR		ACCESS			CONTENTS
			PUBLIC	PRIVATE	LOCAL	ON-LINE	CD-ROM	
1	PERIODIKA	EKT	X			X		SERIALS UNION CATALOG
2	BIBI	MEDICAL SOCIETY & IATROTEK		X		X		BIOMEDICAL BIBLIOGRAPHY
3	DISSERTATION	EKT	X			X		DISSERTATIONS BIBLIOGRAPHY
4	ORP	EKT	X			X		RESEARCH PROJECTS DATA
5	TEE	TEE	X			X		ENGINEERING BIBLIOGRAPHY
6	IGME	IGME	X			X		GEOLOGICAL & MINERAL BIBL/PHY
7	ICONE	ELOT	X		X		X	STANDARDS
8	MIPOTSI	MIPOTSI		X	X			PRESS PUBLICATIONS
9	URSA-dis	PATRAS UNIVERSITY & URSANET		X	X			REGIONAL STUDIES BIBLIOGRAPHY
10	SOCI	PANTIOS UNIVERSITY	X		X			SOCIOLOGY BIBLIOGRAPHY
11	HELLASLEX	HELLASLEX		X		X		LEGISLATION & COURT DECISIONS
12	COMPUPRESS	COMPUPRESS		X	X		X	PRESS PUBLICATIONS
13	KAPA-TEL	KALOFOLIAS		X		X		VARIOUS

Scientific and Technical Information (STI) towards technological and Industrial development: the case of Portugal

por

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ABSTRACT

As a result of the rapid advancement of science and technology during the last decades, there is a tremendous increase in the accumulation of scientific, technical information (STI) and knowledge.

The problem of collecting, cataloguing and accessing information to transfer to those who need it, when they need it, is a challenge faced by all information professionals. The application of information technologies to the management of STI represents an area where promising advancements are taking place, but where the user needs should be the "push".

In this paper an overview will be presented of the national scene in Portugal which will cover some aspects related with different areas of the management of scientific and technical information (STI), and the application of new technologies to it. In particular, aspects related with the :

- modernisation of libraries;
- access to foreign databases (online and CD-ROM);
- advanced training in Information Management;
- development of information systems;
- development of advanced information products;
- participation in NATO programmes in the field of STI;
- research in Information Science,

in Portugal, will be addressed.

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1. INTRODUCTION

The setting of the scene of scientific and technical information (STI) in any country is not an easy task especially if, as in Portugal, there are no national information policies nor a central co-ordinating body for all the information activities and also, as is the case, the country is under a process of rapid

development and modernization since, in 1986, it became a member of the European Community.

Nevertheless we decided that for the purpose of this presentation, the state - of - the - art of the application of information technologies for STI management, in Portugal, could be outlined along the following main lines:

i) modernisation of libraries;
ii) access to foreign databases (online and CD-ROM);
iii) advanced training in Information Management;
iv) development of information systems;
v) development of advanced information products, including those with financial support from PITIE (Programa Integrado de Tecnologia de Informação e Electrónica);
vi) participation in European Programmes towards the development of the Information Market;
vii) participation in NATO Programmes in the field of STI;
viii) research in Information Science.

This paper is prepared taking into account studies published recently (see references), data collected by personal or telephone interviews, done in April/May 1992, and is based on personal experience from the involvement of LNETI/CITI in some programmes such as the Programme for the Development of an Information System for Industry, the MSc in Information Management, from the University of Sheffield, held at LNETI (Laboratório Nacional de Engenharia e Tecnologia Industrial), the PITIE (Programa Integrado de Tecnologias de Informação e Electrónica) and more recently, the European Programme, IMPACT 2 where LNETI/CITI has been designated as the National Focal Point.

2. PROGRAMMES TOWARDS THE MODERNIZATION OF LIBRARIES

The most updated published statistical data (1) indicate that the number of libraries existing in the country are as referred to in TABLE 1.

TABLE 1: Nº OF LIBRARIES IN PORTUGAL

TYPE OF ORGANIZATION	Nº OF LIBRARY
Public Administration	892
Autonomous Organizations of the public administration	152
Regional Administration	51
Local Administration	98
Public enterprises	28
Religious Institutions	7
Public Utilities	15
Professional organisations	5
Non-profitmaking organisations	19
Profitmaking organisations	20
TOTAL	1287

DGXIII from European Commission decided to promote, in 1986, several parallel studies in each Member State to identify the state of the art of the

application of new information technologies in libraries in Europe, as a sequel to the Resolution of the EEC Council of Ministers, from 7th September 1985. These studies, known under the acronym "LIB 2", supplied the required information for the implementation of the EEC Action Programme for Libraries.

The rapid evolution in this sector determined the need for the updating of those studies. In Portugal, this update which was commissioned to the professional association BAD - Associação Portuguesa de Bibliotecários, Arquivistas e Documentalistas (Portuguese Association of Librarians, Archivists and Documentalists) - took place during the year 1991, and the results have been published recently (2).

The main findings of this study were taken into consideration in what is referred to in the next paragraphs, and where indicated updated with the most recent available data.

2.1. National Library

The National Library (NL) holdings are presently ca. two million volumes, and has developed its collection specially in the fields of Arts and Humanities while it has a rather small collection of Science and Technology. With a small budget, two thirds of which goes directly to pay salaries, the NL has no acquisitions policy. The collection is built mainly through the Legal Deposit (which increases the collection by a proportion of 10 to 12 thousand volumes per year) (2,3).

Since 1985, the National Library has been under a reorganisation Programme. As a consequence of this the National Bibliographic Database - PORBASE - was created. It is the Online Union Catalogue of Portuguese Libraries, and it is run by the National Library as a cooperative database based on the joint work of 52 libraries (2). At the present, only 15 libraries are connected online via X25 to the NL (4).

At present (May 1992) the number of references in PORBASE is of 362 000 references (5). However, as stated in (2),

> *"the number of holdings is of 350,000 divided as follows: 220.000 Portuguese recoros covering the period 1950-1991, and among these only 10000 are serials and non-book material; 130000 are foreign literature.*
> *The input format is UNIMARC (1987, 2nd. ed.), and regarldless the material the format is always the UNIMARC.*
> *PORBASE is accessible via the public data network, either by X.25 or by telephone line, and access is free. Searches can be done either in Portuguese or in English".*

PORBASE is an integrated system in the process of installation. So far, modules installed are the OPAC and the Online Cataloguing (bibliographic and authority files). Acquisitions, and serials control are expected to be installed at the end of 1992. The system runs on a GEAC 9000 with the following configuration (2):

- 3 processors;
- 16 Mb RAM;
- 6 Gbytes memory;
- 2 tape units (1600/6250 bpi);
- 1 quality printer (600 lines/minute):
- 4 Ups.

2.2 Public Libraries Network

Portugal is a country without traditions of regular use of Public Libraries.

In 1986, a political decision was taken of,

> *"creating a national network of public libraries aimed at ensuring people the right to culture through the installation of municipal libraries, according to modern concepts and co-financed by the Central*

Administration Ministry of Culture through the Instituto Português do Livro e Leitura (6)".

As a result a Programme to establish a Public Libraries Network is now in operation. This Programme is based on a cooperative action between the Local Authority (at municipality level) and the Instituto Português do Livro e da Leitura - IPLL (the national coordinating body) and it is aimed to cover one third of all the municipalities during its five years of duration.

The support by IPLL includes not only co-financing 50% of the construction of new buildings or renewing old ones with a national heritage interest to be used by libraries for public reading, but also technical support from experts working at IPLL. At the moment 91 libraries have already received support (6).

Despite the fact that this is a relatively new programme, there are already some positive signs of its impact. However, as Moura (6) notes, this is a

> *"... new model of public libraries in Portugal which was conceived to provide infrastructure for real information services to the community. In fact, besides fulfilling their traditional role in promoting reading and culture in general, they should also play an active role in the economic and social development of the region, specially in inner parts of the country".*

> *"In addition, some of these libraries became quite active and are already developing branch and bus (mobile) libraries in order to cover more potential users".*

3. ACCESS TO FOREIGN DATABASES

The use of online foreign databases has been introduced in Portugal by the Scientific and Technical Documentation Centre (Centro de Documentação Científica e Técnica - CDCT) of INIC, in 1977. Due to the pioneer role of this organization the use of these information sources was spread to other research institutes, universities, governmental departments, etc.

However as it is noted in the LIB 2 study (2), in Portugal,

> *"libraries have been installing facilities to access directly to external databases, but figures tend to come down as CD-ROM's become more and more popular.*
> *Libraries mainly accessing foreign databases are those of the public sector, followed by academic, and high education ones (2, pg. 19)".*

and

> *"access to foreign bibliographic databases has increased lately, and this must be explained by the socio-economic development, and a larger need from specialized scientific and technological fields. To access these bibliographic databases means not only an extension to the available information in Portugal, but very often it means the only possible way to access referential information, though at very high cost (2, pg. 21)".*

LNETI (Laboratório Nacional de Engenharia e Tecnologia Industrial) introduced the service of access to online foreign databases, in 1983. The users of this service at LNETI are either internal users (staff of any department within LNETI) and external users - from organisations within any industrial or business sector, other research and development centres, Universities and other information centres within

Portugal and abroad. The on-line hosts accessed since the introduction of this service at CITI included databases covering not only a great variety of scientific and technological fields, but also business and management information. The hosts with which CITI has contracts, in 1992, are outlined in TABLE 3.

TABLE 3: HOSTS with which CITI has contracts (1992)

HOST	COUNTRY OF ORIGIN
BLAISE	United Kingdom
CATBIB	Portugal
CELEX / SCAD	Belgium
DATA-STAR	Switzerland
DIALOG information Service	USA
DIGITE	Portugal
ECHO Service	Luxemburg
ESA-IRS	Italy
INFOCOMER	Portugal
OCDE	France
ORBIT Search Service	USA
STN International	Germany
TRADSTAT	Switzerland

In 1990, the most searched databases to provide services at CITI/LNETI were CHEMICAL ABSTRACTS, BIOSIS PREVIEWS and WORLD PATENTS INDEX.

The users of LNETI online foreign database services, during 1991, were distributed as indicated:

- . LNETI departments - 72%
- . Industry - 20%
- . Universities - 4%
- . Official departments - 3%
- . Others - 1%

The evolution of the number of CD-ROM readers installed either in libraries or in documentation centers, in Portugal since 1987 is depicted in Figure 1. Similar to what happens in other countries, is evident that organizations in Portugal are increasingly considering databases on CD-ROM as a means to exploit external information sources that are becoming available in the market (7).

4. ADVANCED TRAINING IN INFORMATION MANAGEMENT

The lack of training opportunities, in Portugal, for documentation and information specialists at middle and higher levels has been one of the factors hindering the development of the

information sector. For many years, the only training in librarianship, available in Portugal, was a course taught in the University of Coimbra, since 1935, which also included the training of archivists. This was obviously inadequate to meet the requirements for properly trained staff, to respond to the challenges of the development programmes, that have been implemented in the country since the 1974 revolution.

In 1983, a new curriculum was introduced, as a result of initiatives at the University of Lisbon; and a common, two-year Postgraduate Course in Librarianship and Documentation is now offered at the Universities of Coimbra, Lisbon and Oporto, with a two-year curriculum in which the first year is common to all the students, followed by a choice of archives or library and information studies in the second year.

When LNETI/CITI was charged with the responsibility for coordinating the Programme for Development of an Information System for Industry, which included the creation of information nodes at six industrial associations, it was felt (due to the fact that the number and the profile of professionals trained in this Librarianship Course was inadequate) that there was a need to provide training for the Information Intermediaries to staff those Nodes. This was the origin of the Postgraduate Course for Information Intermediaries, an intensive six-month training Course which took place in three consecutive years during the period 1987-1990. This course is well documented in the specialized literature (3,8,9,10,11).

The development of the Master's degree in Information Management, of the University of Sheffiled, at LNETI (11) occurred as a consequence of the asssociation between these two organizations in training information specialists in Portugal, namely during the Postgraduate Course referred to above. Several other factors have also contributed to the development of this joint project. However, the most important relates to "the acceptance by the market of the information professionals trained in the Postgraduate Course for Information Intermediaries" (3).

In the Master's Course in Information Management run at LNETI, the students are registered for the degree of MSc in Information Management at the University of Sheffield, but the Course takes place in Lisbon, on the premises of LNETI, at Lumiar. The programme of study lasts for 18 months and consists of taught modules during the first twelve months, followed by a dissertation during the remaining six months. The course is implemented through a combination of distance - learning units, visiting lecturers and locally - appointed tutorial staff.

The first intake of students for this LNETI/University of Sheffield MSc in Information Management Course occurred in March 1991. Twenty students from this first intake are now preparing their dissertations, and a second intake of thirty students will occur in June 1992.

More recently, a number of other courses using the terms "information management" or "information systems for industry" have been launched in Portugal. For example,

- MBA (Information Management) from Portuguese Catholic University, which occurs as specialization within the integrated MBA programme, and which is more focused on the management of information systems (within the organizations);
- Licenciatura e Mestrado em Estatística e Gestão de Informação, offered by the Instituto Superior de Estatística e Gestão of the New University. An analisys of this syllabus indicates that the intention with this course is to prepare professionals capable of being economic analysts or corporate planners;

- MBA (Sistemas de Informação para a Indústria) and MSc (Sistemas de Informação para Gestão) at INDEG/ISCTE - (Instituto para o Desenvolvimento da Gestão Empresarial) / (Instituto Superior de Ciências do Trabalho e da Empresa).

All these developments are important, as they indicate an increased awareness of the need for adequate trained human resources in the area of information management, in order to meet the challenges that the country faces as a result of the rapid development and modernisation process.

5. DEVELOPMENT OF INFORMATION SYSTEMS

The modernization of a national economy depends largely on the access to information and of the effective use of the information available by all involved in the development proccess namely, managers , academic staff and researchers and technical staff. In effect this leads to increases in productivity and improvements in the innovation and competitiveness of organisations (private or public).

The process of transfer and diffusion of information presupposes the creation and implementation of information systems, that function as vehicles for the information flow.

LNETI/CITI has played a direct role in helping industry to obtain needed information, not only through the provision of online information (as referred to in 3.) but also through its involvement in the development of information systems in several areas, in Portugal, as indicated:

- SII - Information System for Industry (1987-1991) - planning and consultancy for the establishment of Six Nodes in the Chambers of Commerce;
- INOVA - (Instituto de Novas Tecnologias dos Açores) - establishment of an information node to serve the productive sectors of the Azores (1990-1991);
- SNIDesign - a study of information needs for the Portuguese Design Centre (1990);
- RIA - creation of a network in the North of Portugal connecting the information services of Chambers of Commerce (1990-1991).

Just to mention one of these projects, within the project RIA (Rede de Informação Associativa) LNETI/CITI undertook a study to explore the business information needs of entrepreneurs in Northern Portugal (one area where industry is composed mainly of small and medium sized companies, however one of the most industrialized in Portugal) with the aim to collect planning data for the establishment of an information network (12).

5.1. Involvement in co-operative information systems

The development of international or national co-operative information systems is a process that is taking place for some decades and aims at sharing, in an efficient way, the available information resources.

Portugal has been participating in several international co-operative systems, namely the following:

i) AGRIS - (International Information System for Agriculture Sciences and Technology): since 1978 our country has been a member of this system (Direcção-Geral de Planeamento e Agricultura, Ministério da Agricultura).

ii) INFOTERRA (Geneve) - which is an international information system on environmental information produced by national and international organizations located in several countries. Since 1976 Portugal has been a member of this system through CNA - Comissão Nacional do Ambiente. Presently, the INFOTERRA National Focal Point is GETAP-Gabinete de Estudos e Planeamento e Administração do Território, do Ministério do Planeamento e Administração do Território, of the Portuguese government.

Also some national co-operative information systems are being developed. These include:

i) SINAIA - Sistema Nacional de Informação da Qualidade do Ambiente. It is a system created by Direcção Geral da Qualidade do Ambiente and Universidade Nova de Lisboa and aims at support the protection of the environmental by collecting data (air, water, land) and information about the users of environment and of the natural resources.

ii) SIREN - (Sistema de Informação sobre o Aproveitamento Energético dos Recursos Naturais), which is a bibliographic database produced by CEETA (Centro de Estudos em Economia da Energia dos Transportes e do Ambiente, from ISEG) , covering information on: environment, energy sources, electricity supply, energy storage, transport and distribution, energy economy, energy policy, etc. It is accessible through the TELEPAC network.

6. DEVELOPMENT OF ADVANCED INFORMATION PRODUCTS

6.1. Introduction

In 1986, Information Industries were identified as one of the priority areas to be supported [Dispatch 224/86 of the Secretary of State for Scientific Research of the Portuguese Government (D.R. nº 118, II Série, 23.05.86)]. As a consequence, the Comissão Coordenadora das Indústrias de Informação (CCI - Indústrias de Informação) was created. Prior to starting this CCI's activity a report was commissioned from a working group, which was set up by the Secretary of State for Scientific Research (Ministerial Dispatch 40/SEIC/86, Diário da República, II Série nº 12, 15.01.87).

This report was intended to advise the members of the Portuguese Government on the main issues to be included in a National Programme for Specialized Information, taking into account not only the framework of European programmes concerning Information, but also the actual state of development of Information Science in Portugal.

Despite this interest in the Information Industry by the Portuguese Government, a report prepared for the EEC, in 1990, within the IMPACT 2 programme following five parallel studies carried out [not only in Portugal (13) but also in other less favoured regions - LFR], infers that the information industry and information services market in our country are still in an incipient phase of development (14).

6.2. PITIE - Plano Integrado de Tecnologias de Informação e Electrónica. (Integrated Plan of Information Technology and Electronics)

The recognition that in Portugal, like other countries, every effort should be made to develop an Information Industry sector which would produce information products containing information on Portugal, led to the inclusion of the Information Industry as a sector to be developed within the framework of PITIE-Programa Integrado de Tecnologias de Informação e Electrónica, one programme set up, in January 1990 by the Ministry of Industry and Energy of the Portuguese Government, and subsidised by the EEC (15).

PITIE is a national strategic programme, aiming at the development of Information Technology and Electronics in Portugal and whose target areas are implemented within the following sub-programmes (Table 2).

TABLE 2: PITIE - Programa Integrado de Tecnologias de Informação e Electrónica (Integrated plan of Information Technology and Electronics)

HORIZONTAL SUB PROGRAMMES
Human resources
Technological Network
Market
SECTORIAL SUB-PROGRAMMES
Electronic components
Industrial electronics
Defence electronics
Telecommunications
Computer hardware and peripheral equipment
Software industry
Information industry

Of the 171 applications to PITIE financial funds, (April 1992), 95 were submitted to the Software Industry sub-programme, and 18 projects were submitted to the Information Industry sub-programme Figure 2 (16).

The new Information Products, being developed with financial support from PITIE, use different technologies including:

- Online databases;
- Expert systems;
- Expert systems (neural networks);
- Optical discs;
- Audiotex;
- Multimedia;
- Videotex.

and cover a significant variety of types of information such as: geographical, agro-industrial, information for local government (municipalities), cultural information (museum information), management information, economic information, legal information, etc.

Within the scope of PITIE programme, a study is being carried out, since June 1991, aiming to obtain a better

understanding and a deeper knowledge of the potentialities for the development of the software and information industries in Portugal and also to identify the scenarios for the implementation of development strategies for a future technological policy for the Portuguese Software and Information Industry.

This study (17), which is forecasted to be concluded by June 1992, is hoped that it would contain valuable data about potentially interesting information industry products to be developed in the Portuguese context in the forthcoming years.

6.3. IMPACT I and II - Information Market Policy Actions

The Information Market Policy Actions (IMPACT 1) is a two-years programme for the development of the European information services market (1989-1990) adopted by the Council, on 26th July 1988 (18).

An important aspect of the IMPACT programme refers to the implementation of large-scale pilot/demonstration projects on advanced information services in a number of subject areas (patent information, image banks, intelligent interfaces, tourism information, information on standards, road transport information).

Within the nineteen pilot and demonstration projects chosen for support under IMPACT 1, a Portuguese organization is a partner in one of those 19 selected. It is the Ulysses International, a project aiming at making available tourism information, especially in less favoured regions.

This project involves (19) a number of separate organizations, FIA - Fédération Internationale de l'Automobile, CETA - Software and French components, Irish Tourist Board, University of Ulster, Automóvel Clube de Portugal, Automobile Club de France and Direcção Geral de Turismo (Portugal)] and comprises a number of separate elements such as:

a) The establishment of an accommodation reservations system within the Irish Tourist Board's tourism information service, Gulliver;

b) The development by the University of Ulster of a public-access terminal as an adjunct to the Irish tourism information service;

c) A minitel-based tourism information service incorporating a natural-language workstation and a re-routeing service to some 300 minitel tourism services in France;

d) The creation of a national tourism information system and network of regional offices in Portugal;

e) The creation of an information service on road conditions (Automobile Club de France).

FIA assures the coordination of these elements and liaision for standards.

Also, within the IMPACT 1 programme there are projects especially oriented to libraries in which Portugal participate, through the National Library. These are (20):

- The National Libraries CD-ROM Project;
- EROMM - European Register of Microform Masters;
- Project involving single countries (Portugal): the National Library has received support for a project to develop software for the extraction of records and for their downloading to local systems with implementation of Portuguese characters and diacritics.

Despite the difficulties ineherent to transnational projects it is our believe that it is through this kind of cooperative initiatives, linking organizations across national boundaries, promoting the

sharing of their knowledge, experience and development efforts that an effective transfer of expertise can occur and the information market can take off in countries like Portugal and other less favoured regions of Europe.

The IMPACT 2, the follow-on programme has been approved by the Council of Ministers in 12th December 1991 (21). IMPACT 2 requests not only specific attention for less favoured regions in Europe (LFRs) and for small and medium sized enterprises (SMEs) but also asks to exploit the results of other national or community programmes (22). The strategic aim of IMPACT 2 is improving the accessibility of information at the European level for all interested parties (INFO EURO ACCESS).

In order to stimulate the development of the information services market in LFR's (Greece, Italy, Spain, Portugal and Ireland) National Focal Points-NFP have been set up with the support of EEC in these countries, with the aim to promote the participation of organisations in those countries in IMPACT 2 Programme, the use of electronic information services and an increased awareness for the Community and national programmes that can contribute to the development of the information sector.

In Portugal this task has been committed to CITI - Technical information Center for Industry of LNETI (Laboratório Nacional de Engenharia e Tecnologia Industrial) which was nominated for this function by the Portuguese government, in December 1991.

Among others the following tasks have been implemented so far:

- Implementation of NFP Partnership database;
- Organization of the Information Day;
- Publication of articles in specialized press.

7. RESEARCH IN INFORMATION SERVICE AND INFORMATION MANAGEMENT

The existence of R&D activities in Information Science to create a body of knowledge is essential to ensure that the production, transfer and use of information is done in an effective way.

As Pinelli (23) points out:

> *"A body of knowledge derived from systematic inquiry is a prerequisite for any endeavor to gain acceptance as a scholarly field of inquiry. Good solid research advances the state of the art by contributing to the body of knowledge that, in turn, may be applied to solve numerous problems faced each day by practitioners".*

At a survey conducted by CITI, within the context of our activities as Member of AGARD/TIP Panel during January and February 1991, aiming at identifing what research on information science was done in Portugal, a questionnaire was sent to all R&D state owned organizations, Government funding departments, private foundations and enterprises, in a total of eleven. Seven replies to the questionary were received, but only one R&D Laboratory and one Government Funding Body reported that are financing research in Information Science and/or Information Technology. However, we wonder if the given definition of "Information Science" was fully understood, as we are aware that one governmental Department that by then was funding a PhD research Project in Information Science, did not mention it as such.

This is an indication of the lack of awareness of this as scientific area in the country. The research carried out in Information Science at LNETI was initiated in 1984 and since then the R&D activities at LNETI have been oriented

mainly towards the development of information systems in several areas aiming at increase the efficiency of information transfer to several kinds of users in the country.

At the moment the different research projects undertaken by CITI staff and by the MSc students working under University of Sheffield/CITI staff supervision are within one of these main areas:

- Information Policy;
- Information Needs and Use;
- Information Systems Design and Implementation;
  - hypermedia, multimedia, videotex, office automation, computer assisted learning, management information systems, geographical information systems
- Evaluation of Information Services and Systems;
- Maketing of Information Services and Systems.

It is hoped that it is through the implementation of these R&D activities that we can contribute in an efficient way to a better application of the technologies to information transfer in Portugal and also to understand the role of information in Portuguese economy and in our society in general.

8. THE NATO ADVISORY GROUP ON AEROSPACE RESEARCH AND DEVELOPMENT (AGARD)

Portuguese representation on the AGARD Technical Information Panel has provided the following benefits,

- the opportunity to take part in the Panel Programme which is aimed at promoting effective and efficient handling of scientific and technical information to assist R&D activities in aerospace and defence;
- improved cooperation between Portugal and the other NATO nations in the management and exchange of scientific and technical information;
- a leading role for Portugal in the establishment and developmend of a Research Agenda for the Technical Information Panel.

The foregoing ensure that Portugal is well represented on the international information scene by virtude of this important forum for exchange and cooperation between Heads of National Information Centres and Libraries.

9. THE WAY TO THE FUTURE

As to the future, I can do no better than to echo the words of LNETI's President, Professor Veiga Simão, in his essay "The Third Millenium", written for the special edition of Diário de Notícias, celebrating the 500th anniversary of the Discoveries (24). He said,

> *"Society based on Information, that is to say Knowledge, will see the coming of a new generation of systems, characterised by the integration of all data and by the total connection between them.*
>
> *With the products of information at individual and corporate level becoming commonplace, new methods of work, both corporate and institutional, will be determined."*

Be assured, ladies and gentlemen, that Portugal intends to be an active member of this new Information Society.

Acknowledgments

We would like to express our thanks to Mrs. Teresa Serraventoso and Ms. Isabel Sequeira for collaborating in collecting some of the more updated information.

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FIGURE 1

Nº. OF CD-ROM READERS INSTALLED IN LIBRARIES AND DOCUMENTATION CENTERS IN PORTUGAL

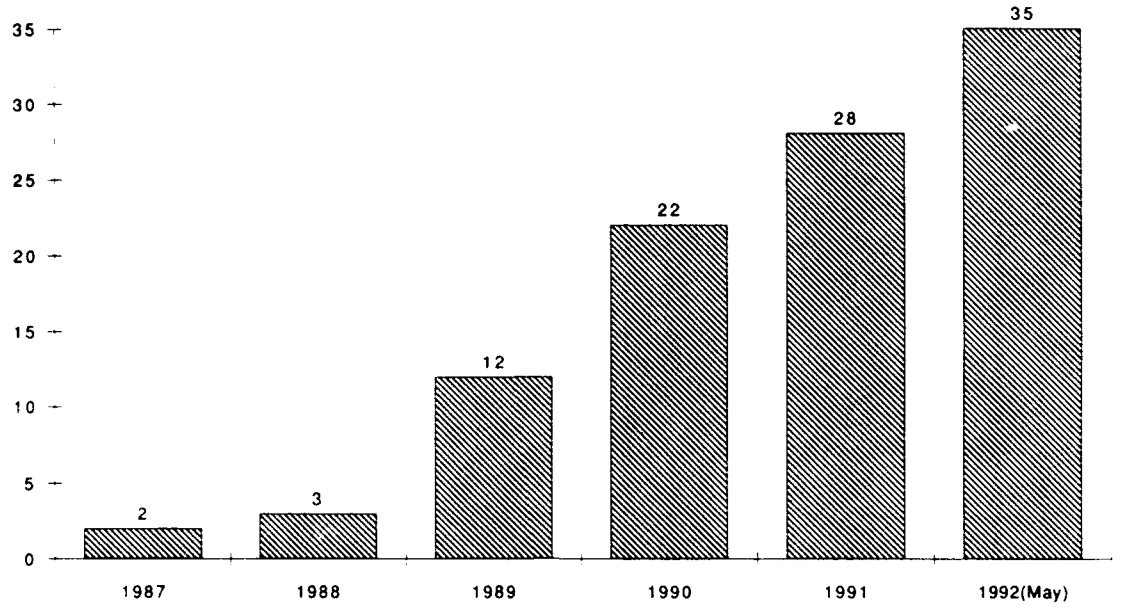
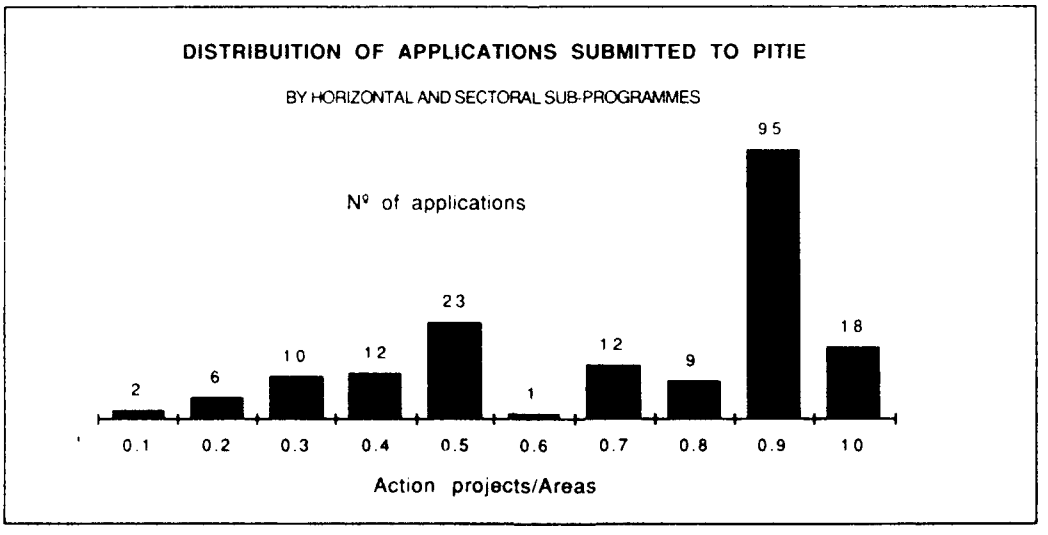


FIGURE 2



01 - Human resources
02 - Technological network
03 - Market
04 - Electronic components
05 - Industrial electronics
06 - Defence electronics
07 - Telecommunications
08 -Computer hardware and peripheral equip.
09 - Software industry
10 - Information industry

ESTABLISHING A SCIENTIFIC AND TECHNICAL INFORMATION PROGRAM:

PLANNING AND RESOURCE MANAGEMENT

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Washington DC 20546
USA

"All the technological knowledge we work with today will represent only 1 percent of the knowledge that will be available in 2050."

....prognosis by the World Future Society

INTRODUCTION

In the last 50 years, technological advances have accelerated at a rate unprecedented in history. We are experiencing a tremendous expansion of scientific and technological effort in many directions, and the result is a fantastic increase in the accumulation of scientific and technical information and knowledge, and --paradoxically-- in the need and search for even more information and knowledge.

A strong science and technology base is a national necessity in a competitive world. Today's basic research efforts and investments establish the foundation needed for the far term to support a broad number of capabilities and opportunities. Concept options and capability needs and opportunities are derived from both user pull and technology push, and represent the "realm of the possible" to the user. Through a requirements process, an organization can assess, validate, and fund those concepts that best satisfy the users' evolving needs. This requirement process requires that the organization have reliable, up-to-date information.

An integral part of the research and development (R&D) process is the scientific and technical information (STI) associated with it. STI is both a raw material (input) and a product (output) of this process. The systems that support STI are part of the scientific and technical (S&T) infrastructure. The data or existing knowledge bases are a raw material necessary for the production of new findings and developments. Strong STI pro-

grams are critical to a strong national S&T base.

Information processing in aerospace and defense R&D is viewed as an ongoing problem-solving cycle involving each activity within the innovation process, the larger organization, and the external world. For purposes of this paper, the innovation process is conceptualized as a process of related activities or units beginning with research on one end, and service and maintenance on the other. Figure 1 attempts to graphically portray this process.

For any given task, each activity or unit within the innovation process must identify, gather, and assess scientific, technical and market information from the external information world. New (external) and established (internal inhouse) information must be effectively processed within the work area: decisions, solutions, and approaches must be worked on and coordinated within each activity and within the organization; and outputs, such as decisions, processes, products, and information, must be effectively transferred to the external environment. The outputs of this process create conditions for another set of activities, thereby initiating another information processing cycle. Numerous studies have found a strong relationship between successful innovation, idea formulation, and information external to the organization.

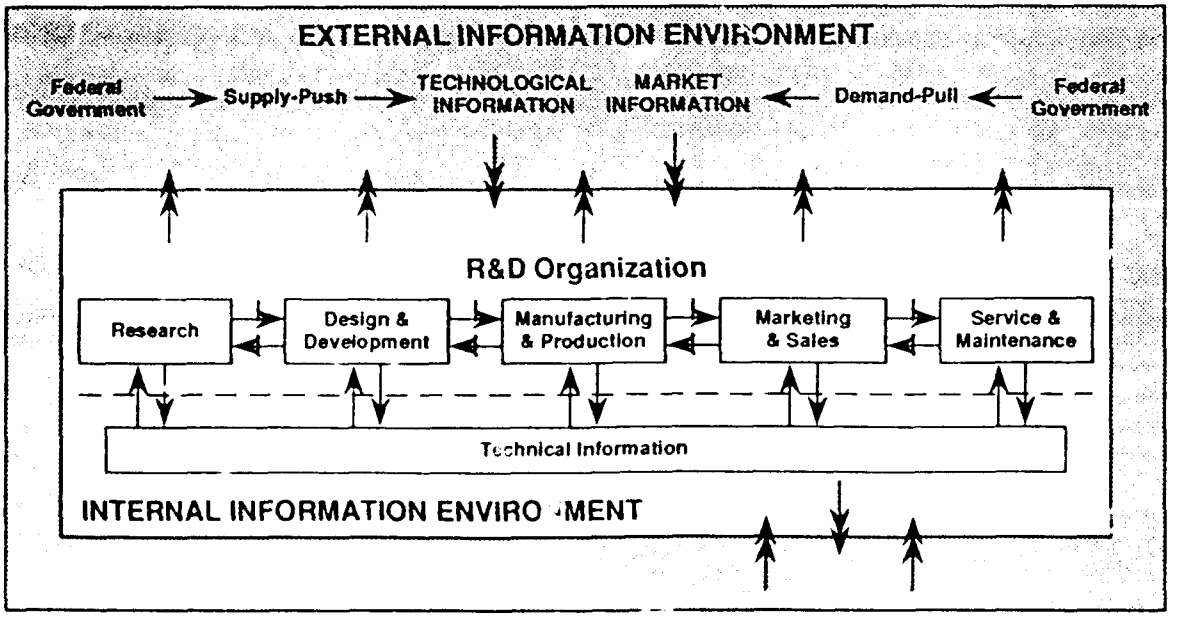

Figure 1. The Innovation Process as an Information Processing System

A strong STI program will ensure the acquisition, dissemination, and exchange of STI, so that the information needs of our people are expeditiously fulfilled. A strong STI program will make theoretical, scientific and technical work more effective through better availability of STI to the managers, scientists, engineers, and others who make technical decisions in or for the organization.

In the U.S., STI received attention as early as 1963, when the Weinberg Report documented the following conclusions, which are as valid now as they were then:

"Transfer of information is an inseparable part of research and development. All those concerned with research and development - individual scientists and engineers, industrial and academic research establishments, technical societies, government agencies - must accept responsibility for the transfer of information in the same degree and spirit that they accept responsibility for research and development itself."

"New science and technology rests firmly on the base of information generated in the past; thus the effectiveness of future work in universities, government laboratories and industry depends on the efficiency of present information transfer."

Effective use of known technology will reduce the costs, reduce the time from research to development, production, and acquisition, and improve management throughout the organization. In short, there is a more effective use of the resources allocated with a concomitant acceleration in development of systems and products.

DEFINITIONS

Since we are going to be talking about planning and resource management of STI programs, it may be wise to define the terms we will be using.

+ Information - the collected set of facts existing in a document, another person's mind, an information service, a folder, or some other source. It is the aggregate of all the journals, books, technical reports, manuals, drawings, patents, handbooks, and databases that can be read or referenced in order to perform some task.

+ Scientific and technical information (STI) - the collected set of facts resulting from scientific, technical, and related engineering, research, and development efforts. It includes information from both basic and applied research in the entire range of scientific disciplines - physical, social, medical, terrestrial, and biological.

STI includes new theory and information obtained from experimentation, observations, instrumentation, or computation in the form of text, numeric data, or images. STI may be further transformed, described, evaluated and/or synthesized and recorded in print, digital,

magnetic, or other media to enhance its communication and its usefulness and value to a wide spectrum of users and uses.

+ Knowledge - the result of using information to increase our awareness. Individual items of information have little meaning. It is only when they are put together or processed that they become useful. Access to information gives it the potential to become knowledge.

+ Understanding - the bridge between information and knowledge. To make the necessary connections between raw information and applied knowledge means making associations with something you already understand.

+ Information Service - collects, catalogs, stores, and provides retrieval of information items.

+ Information Management - concerned with the operation, promotion, and utilization of the information services. Its main function is to ensure that STI is made available in a usable form to those who need it when they need it.

+ STI Program - provides information management and services. The STI Program management is concerned with the operation, promotion and utilization of established information services. These services provide for collection, cataloging, storing and retrieving information items. In essence, the STI Program is concerned with establishing and maintaining the scope and effectiveness of collecting, processing, disseminating, and applying STI.

VALUE OF SCIENTIFIC AND TECHNICAL INFORMATION

Establishing and maintaining a viable STI Program requires resources - money and people. These resources will only be as available as the value of the STI Program is perceived. STI is a valuable resource that directly affects the cost of performing a technical task, the quality of results, and productivity.

Oftentimes, the R&D community is accused of duplication and waste. For example, in the early 1990s, the U.S. national R&D budget was $68 billion dollars; $41.4 billion of this amount was for national defense, of which the Air Force received $13.2 billion. The scientific and engineering community has been accused of wasting from 10 to 50% of the resources simply because people were not receiving adequate and timely information. If this were true, it meant that the Air Force alone was wasting from $1.3 to $6.6 billion dollars a year.

How can the value of STI be quantified, how can we put a dollar value on it? There is a constant desire to identify a clear "return on investment" in the STI world. The demand for accountability, especially in times of budgetary constraints, forces a quantitative value to be placed on information management. However, quantitative data on the value

of information that is universally accepted and believed, will never be available. There is no calculus of quantitative information value.

A large number of success stories exist and have been collected. Most of these quote a specific dollar savings that can be directly attributed to finding a piece of information. But these and other historic attempts to absolutely quantify STI have been subject to a great deal of criticism, and very large reported savings tend to be viewed with some skepticism.

Some of the major efforts that have been carried out were by King Research, by NASA/DoD, and by the Institute for Defense Analysis, among others. This topic is of such high interest, that it was the sole subject of a NATO AGARD Lecture series in 1988.

King Research made studies on the use and value of the U.S. Defense Technical Information Center (DTIC) products and services, and also performed a parallel study for the Department of Energy. One result of these studies was the determination of a "benefit/cost ratio" for technical information support to be between 8 and 45. This result means that every dollar spent on information support yields between 8 and 45 dollars in value.

An ongoing NASA/DoD study, entitled "Understanding the Diffusion of Knowledge in Aerospace: A Research Agenda", is examining in detail the ways in which technical information transfer takes place. This study, which has already yielded interesting results concerning the perceived importance of various technical products, will lead to a deeper understanding of the role and value of technical information.

During one phase of the Project, data were collected from U.S. aerospace engineers and scientists regarding their use and perceived importance of various information products, including AGARD and foreign language technical reports and technical translations. Data were also collected on the purposes for which these products were used, why they were not used, the factors that influence their use, how users became aware of these products, how these products are physically obtained, and the quality of these products.

Preliminary results indicate that over 85% of the respondents used conference and meeting papers and journal articles in performing their professional duties. Over 75% used NASA technical reports, and over 66% used U.S. Department of Defense technical reports. In contrast, 36% used AGARD technical reports, 27% used technical translations, and 21% used foreign technical reports (see Figure 2).

Over 50% of the respondents rated conference and meeting papers, journal articles, NASA and DoD technical reports as important in their professional duties. Only 15% rated AGARD technical reports highly, and about 7% felt similarly about technical transla-

tions (see Figure 3).

The study is ongoing, and interesting results are being obtained.

The Institute for Defense Analysis (IDA) recently looked at the qualitative and quantitative benefits associated with 50 selected users of DoD Information Analysis Centers. Although all 50 users cited benefits, only 13 were quantifiable in terms of reduced test times, lower labor costs, cost avoidance, and acceleration of R&D.

The aggregate task funding for these 50 tasks was about $15 million dollars, of which about $3 million was for the 13 tasks quantifying their results. The combined quantified information-related benefits for these 13 tasks was in excess of $21 million dollars.

A typical example from this study was a U.S. Air Force project to develop a program for improving the reliability of built-in systems for fault detection. The information support to this project led to reduced spare parts and reduced down time of an essential operational system. The quantified information benefit was over $6 million dollars.

Perhaps the better and truer indicators of the value of STI are the qualitative measures. Some of these measures are: the timeliness of information, improvements in productivity, and improvements in quality.

Timeliness is two things. It is the response time to the request for service, and it is the extent to which the information is in step with the current wave of technology. If

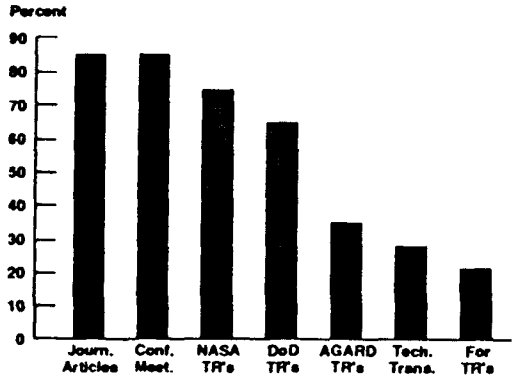

Figure 2. Use of Information Sources

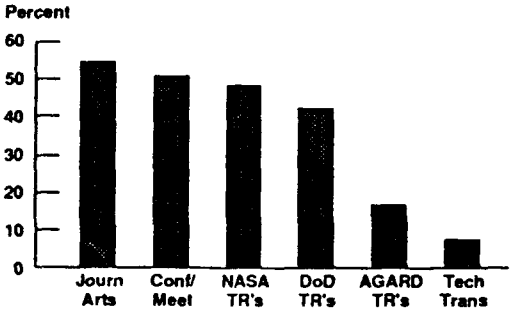

Figure 3. Importance of Information Sources

the information contributes to the rapid completion of a job, and if it is up to date, then it is perceived to have high qualitative value.

STI increases productivity and effectiveness of research and engineering programs by avoiding unnecessary overlap and duplication of efforts, and allows users to maximize their time and resources. Using information resources will avoid unproductive lines of work and will provide guidance as to techniques and approaches to perform one's primary job. In addition, the time saved by avoiding having to perform work already completed can be converted to productive work.

The use of STI resources can directly impact the quality of the work being performed. By examining the previous work that has been done, one is able to build on the successes and failures of the projects before. Knowledge of the past work will influence the direction of the work effort, and of course, will affect the outcome.

No aspect of information support is free; every aspect has an inherent cost. The libraries, the librarians, and placing one's documents in a depository all cost money, and are part of the cost of information support. But keep in mind that information that already exists is much, much cheaper than new information that must be generated, so storing it and retrieving it makes sense.

Do all questions cost the same to answer? No...questions that have been previously addressed, answered and stored are incredibly cheap compared to new work.

A study has placed the cost of technical information support at about $500 to $1500 per professional employee, whether or not the employee uses these services. This is the total cost of the information collections and the people providing information services. This study also showed that the identical people would be willing to pay about $5000 each for the same level of information support as they were presently receiving.

What about the costs of not having the required information? These costs can only be measured in terms of failures such as duplicated work, lost opportunities, delays, failed experiments, and lower quality work that might result from not having the proper information. Each of these represents a cost just as real as a dollar spent.

Unlike successes, failures from lack of information or not finding the appropriate information are usually hidden. No one wants to admit or advertise that they discovered, after the fact, some information that would have affected the outcome of their work had they know that information beforehand.

The worst case is when potential users do not learn of the existence of needed information, and therefore are not able to request the information even when using the existing

procedures.

In summation, STI has substantial value, and should be viewed as an extremely important resource. Effective use of STI can result in large dollar savings in staff time and work, as well as higher quality and more timely work. The use of STI correlates directly with productivity.

The purpose of an STI program is to improve the scope and effectiveness of collecting, processing, disseminating, and applying scientific and technical information. The goal of an STI program is to ensure that the valuable resource called STI is rapidly and effectively exchanged among our scientists, engineers, managers, and administrators.

MANAGEMENT OF AN STI PROGRAM

The four basic management functions are planning, organizing, measuring, and controlling. Figure 4 attempts to graphically depict the management functions necessary to establish a strong and viable program.

The cornerstone management function is planning...planning whatever needs to be done such as how to promote your function, how to implement procedures, or whatever your goals or the needs of the job are. Before any planning can take place, you must have already established clear, achievable, measurable, and understandable goals. Planning is simply laying out the steps necessary to reach these goals.

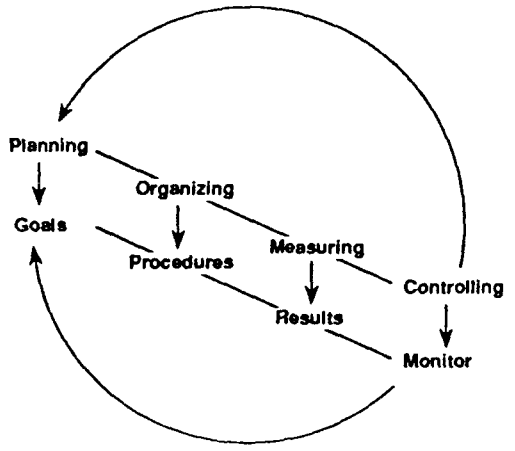

Figure 4. Graphic Depiction of the Management Function

In order to set work-related goals, you must have a clear understanding of what is expected of you. In the case of the STI function, the fundamental guidance must be a set of governing regulations and policy. Two important notes about goals...they must be physically achievable and measurable.

Another item to remember, is that if you lack the training required to reach your goals, and you ignore this fact, you won't reach them either. If you have a goal and don't have the skills to reach it, either get the training you need, or find someone else to do those aspects of the job that are beyond your skills. An example would be the goal of having a microcomputer-based tracking system. Despite the hype that we have all been subjected to by the microcomputer industry, not everyone has the computer skills to implement even a simple tracking system. If you are in this situation, recognize where you need help and get it.

So, the secret to planning is setting goals. The next step is easy...simply list the steps necessary to reach those goals, the estimated time required to accomplish each of these steps, and the sequence in which you must do them. The key is being able to visualize the complete process going from step to step, and to be able to visualize the situation before and after each step.

The second fundamental management function is organizing. The management of an STI program will give you all the opportunities you need to test your organizing skills. Mainly, there will be procedures to set up (and improve) to help carry out many of the STI Program duties. Most of the organizing that you will do in your job will involve setting up procedures so that recurring duties are carried out efficiently. The steps to successfully setting up a procedure to carry out a requirement are:

a. List the inputs to the procedure and everything you know about these inputs.

b. List the outputs from the procedure and everything you know about them.

c. List the processing steps that get you from the inputs to the outputs.

d. Formalize these steps into a procedure, creating whatever intermediate forms, checks, summaries that are necessary to control and monitor the procedure.

e. Give it a try and improve the rough spots.

The key to success in achieving goals is being able to measure tangible results and compare these results against an existing situation and a projection. Basically, for every procedure you develop, you should include either an ongoing (such as a performance chart) or periodic (such as a regular summary page) performance measure.

The final management function is controlling. If you

have taken a management approach to establishing and maintaining an STI program, have set up procedures to handle all recurring work, and established performance measures to determine if the procedures are working, then controlling your situation should be quite simple and easy. The key to controlling your situation is being able to monitor the ongoing status of your various procedures. Again, there is simply no way you can do this without performance measures that reflect the status of each.

PROGRAM POLICY AND GUIDANCE

In order to be effective, an STI Program must perform under some mandate, whether it be national legislation, or a program management directive within the organization. This mandate must spell out the policy, scope, concept, and responsibilities of the program and provide guidance that will steer the program, and give it its viability and lifeblood.

In developing policy and guidance for an STI Program, there are many factors that must be taken into account. One must take into account the current STI environment which is characterized by:

+ an exponential creation of information;

+ rapid advancements in technology;

+ disparity of user capabilities;

+ threats to national security;

+ the problem of intellectual property rights; and

+ globalization of information management.

These characteristics imply that one must address both the short term and long term perspectives.

Policy and guidance must include an ability to cope and incorporate procedures to address changing requirements, changing technology, and changing opportunities. The program must provide for developing new processes, procedures, and systems, and must address complex and evolving policy issues, and take into account the large vocal user community, and be aware of the political interests that abound.

The policy should state that the organization under which the STI program is established will pursue a coordinated, comprehensive STI program to ensure that STI provides maximum contribution to the advancement of science and technology; permits timely, effective, and efficient conduct and management of research and engineering efforts and programs; and eliminates unnecessary duplication of effort and resources by encouraging and expediting the interchange and use of STI. The STI program shall provide for interchange of STI within and among organizational components, contractors, federal or national agencies or entities, and the national and international

scientific and technical community.

The scope of the mandate should include functions vital to the operation and management of an STI Program, such as management of technical libraries, technical information centers and data systems of technical information; the application of information and decision-support systems to manage research and engineering programs; and the conduct of programs to explore and apply advanced techniques and technologies to STI processes.

The concept of the STI program, as defined in the mandate, should include such items as:

+ The STI Program will be operated as a coordinated structure of generally decentralized activities, with overall policy direction vested in the STIP Manager.

+ An element shall be established to provide centralized operation of specific STI functions, such as technical document access and dissemination and database and reference service; to serve as a focus for actions required to provide and enhance STI services; and provide direct information system and database support in coordinating the overall STI Program.

+ Maximize use of existing organizations presently engaged in collecting, processing and disseminating STI. The activities of each STIP function shall be coordinated to produce a coherent program providing maximum data and resource sharing and effective service to all bona fide users of the STI services.

+ Improve the scope and effectiveness of collecting, processing, disseminating, and applying STI. The STI Program shall apply the latest available technologies and provide for maximum participation and compatibility among the information programs of disparate components and organizations.

+ Ensure effective coordination and liaison are effected among the STI program and those information programs involving security management, technical data management, manpower, logistic, and acquisitions systems to ensure maximum compatibility, interchange of information, and avoidance of unnecessary duplication of effort.

Hence, an STI program can be established and developed to provide information support and services to:

+ improve mission effectiveness;

+ improve the scope and effectiveness of collecting, producing, disseminating, and applying scientific and technical information;

+ support the information needs of managers, scientists, engineers, and technicians;

+ increase productivity and effectiveness of research and engineering programs;

+ improve capabilities

through research and application of new technologies;

+ maximize use of R&D resources;

+ overcome incomplete and inaccurate databases; and

+ facilitate domestic technology transfer.

Establishing and assigning responsibilities must consider and include the entire gamut of the STI Program, from the very highest level down to the organization's Program Manager and his/her staff.

Responsibilities at the higher levels must be described and assigned to ensure supervision, coordination and review functions.

The lower level responsibilities should include specific duties to ensure the policies and procedures established for the Program are met and maintained.

ORGANIZATIONAL STRUCTURE

The office of primary responsibility for an STI program should reside in that part of the organization that is responsible for the research and development efforts of the organization. Within the US Air Force, for example, the office of primary responsibility resides in the Office of the Assistant Secretary of the Air Force for Acquisition; more specifically, in the Directorate of Science and Technology, the office that is responsible for the management and oversight of the entire Air Force research and development program. (See Figure 5).

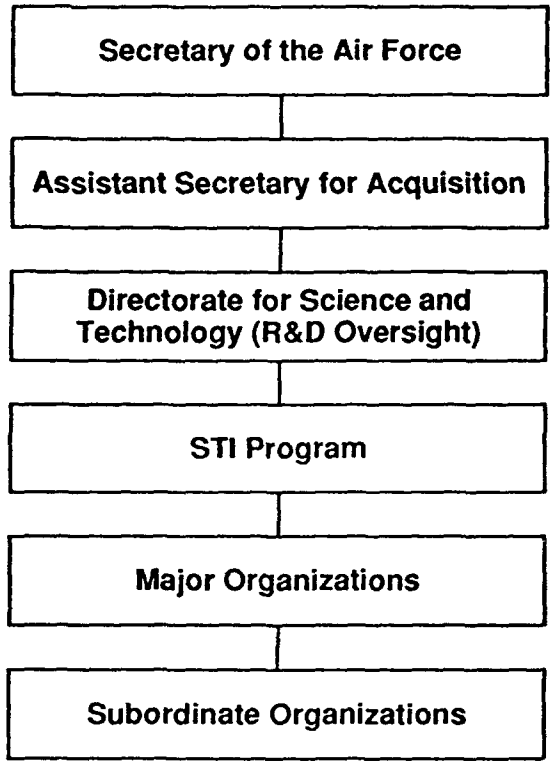

Figure 5. Organigram of the Air Force STI Program Function

Within the US Navy, the office of primary responsibility resides in the Office of the Chief of Naval Research, again, the office that is responsible for the management and oversight of the entire Navy research and development program. Within NASA, the STI program resides in the Information Resources Management Division, more specifically, in the Scientific and Technical Infor-

mation Branch. (See Figure 6).

An attempt has been initiated to transfer the STI program to the Office of Aeronautics, Exploration and Technology, the office that is responsible for the management and oversight of the NASA R&D programs.

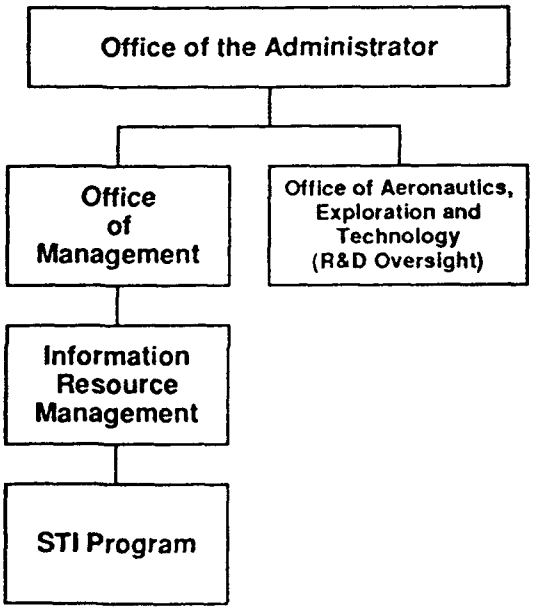

Figure 6. Organigram of the NASA STI Program

After the STI Program has been established and developed, resources must be assigned to manage and monitor the program in each major component of the organization. Within the US Air Force, this often requires assigning STI program managers or offices at appropriate subordinate levels or echelons; hence STI program managers are found at each laboratory, maintenance, and logistic facility.

In NASA there is a similar structure; STI programs are established at each of the NASA centers and facilities.

DATA SOURCES

One of the primary tasks of an STI program is to ensure that documentation of all research and development efforts conducted within the organization is captured and available for other users. Ideally, this would be broken down into three phases:

+ what is planned;

+ what is currently ongoing;

+ what has been done.

The first, the planning and programming database would reveal what is being contemplated in the outyears. This could provide a basis for other organizations to assist in the research efforts.

In the U.S., the Air Force and other Defense organizations provide such information in Research Planning Summaries (RPS). These were available to other governmental agencies and the private sector through the Defense Research On-Line System (DROLS) maintained by the Defense Technical Information Center. These RPS were discontinued a number of years ago, but the same information is available through Congressional Descriptive Summaries, which are brief summaries of future R&D plans submitted to Congress

at budget time.

The second, the research in progress database, is a collection of technically oriented summaries describing ongoing research, engineering and studies efforts being conducted. It provides a comprehensive database comprised of summary descriptions of the technical content, performers, monitors, and funding sources of research, engineering and studies efforts. These summaries provide a description of the principal technical objectives, the technical questions being explored, anticipated results, applications or goals. They also provide a brief outline of the approach or plan for conducting the work, including specific tests or equipment to be employed, and anticipated problems. In short, this database includes information concerning the what, where, when, how, at what costs, by whom, and under what sponsorship research, engineering, and studies efforts are being performed.

In the U.S., the Air Force and other Defense organizations provide input into the Work Unit Information System (WUIS) database maintained at DTIC and available through the DROLS. Within NASA, similar data on R&D efforts in NASA are made available through the Research and Technology Objectives and Plans database, available through RECON.

The third database, what has been done, is a collection of documents which describe the results of research, engineering, and studies efforts. The types of documents that should be entered and collected in this effort include technical reports which are formal presentations of results; conference proceedings which are compilations of presentations, lectures or papers delivered at a meeting, symposium, conference, convention, etc.; special reports which are documents directed toward specific users; technical memoranda, technical notes, or technical papers which record interim or partial results of an effort; and progress reports or interim reports which record intermediate results. Theses, journal reprints, and patent applications are other forms of documentation that should be included in the completed research file.

The US Air Force and other Defense organizations provide documentation of R&D results to the DTIC. These are input and made available to qualified users through the Technical Report database available through the DROLS. Within NASA, documentation of R&D results are provided to the NASA Center for Aerospace Information (CASI), and then made available to qualified users through RECON and to the public through DIALOG.

These three databases constitute an extremely valuable, and the single most important information services for scientists, engineers, technicians, managers, and administrators. A search within these databases serve a number of important objectives; namely, to

+ Help managers identify

research, engineering, and studies efforts in a broad range of scientific disciplines and technologies:

+ Permit managers to easily coordinate programs with other components, and with other agencies and branches of the government to eliminate unnecessary duplication of effort;

+ Help individual scientists and engineers determine current and past efforts related to their work;

+ Enable scientists, engineers, managers, and administrators to identify individuals working in technical areas of interest;

and

+ Allow scientists and engineers to maintain current awareness through periodic reviews of pertinent ongoing work or completed work.

TRAINING/ORIENTATION

The duties and responsibilities of STI Program Managers for administering and monitoring the program are extensive. Accordingly, to fully understand their responsibilities, program policies, and the procedures and controls necessary for administering the program, a formal training curriculum should be established to support effective implementation, management, and operation of the STI program. The course should be designed to train STI program managers to carry out their duties and responsibilities; it is designed to ensure STI program managers are aware of the complete spectrum to STI duties, contain sufficient guidance as to how to carry out these duties, are aware of the complete set of STI regulations and policies, and introduce them to some of the skills that will help them in carrying out their duties. It should also provide an understanding of the policies that are behind the STI program, and the functioning of the various organizations and activities that an STI program manager will come in contact with on a regular basis.

In addition to the formal training curriculum which looks at the whole of the STI program, it is desirable to establish training on certain aspects of STI, for example, finding sources of information to support your scientists and engineers. These sources may be from local, national, or international assets.

Also, it is desirable to conduct annual STI program managers policy conferences to update program managers on current or anticipated policy changes, trends, and new technologies in information management. During these meetings, it may also be desireable to conduct workshops to help the STI program managers to do their job efficiently and effectively.

To further professional development, STI Program Managers should be encouraged to attend training sessions, seminars, lectures, workshops, and symposia concerning information

handling, support, and services, as well as those concerning topics that relate to STI program management, such as data management and contracting, and academic course offered through local institutions concerning information management, as well as professional society meetings and NATO AGARD lecture series and symposia concerning the management of scientific and technical information.

The best, most complete information support and service program is worthless if it is ineffectively promoted, and the user community is in ignorance of its availability and the support it provides. An STI program managers responsibility in the are of user support and service goes beyond just setting procedures in motion to ensure that the appropriate services are available.

Information support and services must be promoted, and the knowledge of their availability must be the rule, not the exception.

Training materials must be developed and produced to assist STI program managers in establishing and conducting a continuous indoctrination program for helping scientists, engineers, technicians, managers, and administrators (the users and producers of scientific and technical information) in meeting their responsibilities to the program, and for informing them of available products and services. The users, producers, and providers of scientific or technical information need recurring training on the program products and services to fully support their information program objectives.

The U.S. Air Force developed and produced a number of videotapes to be used for indoctrinating users and producers of STI. "The USAF STINFO Program Overview" concerns itself with the functions and operations of the STI program, and helps them become more effective users of STI services by examining what the STI office does and how it does it. As an adjunct to the Program Overview, a short 15-minute videotape, "Welcome to the World of STINFO", highlights the main functions of the STI program. Another videotape, "The Value of STINFO", allows viewers to examine and appraise their attitudes towards STI. It discusses the value of STI and the role it plays in the technical world. The videotape helps convince the viewer to realize just how important STI is, and inspires them to become supporters and more complete users of STI products and services.

CURRENT INFORMATION ENVIRONMENT

During the past few years, STI program managers have been battling budget cuts, coping with personnel cuts and losses, acquiring new equipment, etc. The relationships between R&D managers and STI managers nas grown apart; more and more they work as separate communities, with the STI community serving a passive role by responding to service requests of the R&D community.

STI Programs must refocus and concentrate on how better to support the R&D community, as well as how to support scientific and technical productivity. This apparent gap between R&D managers and the STI managers must be filled; information specialists must be actively involved in all stages of R&D. This participation must not be a passive "Don't call us we'll call you", but the result of active membership on the R&D team.

There are several trends emerging which have a significant impact on the conduct of science, research and development and the corollary management activities, and which dictate that generic issues of STI be addressed. The trends include the use of information technology, the growth of interdisciplinary research, and an increase in international collaboration.

Information technology, which has dramatically changed the conduct of research, has brought forth a need to better understand and manage its exploitation. Computerized instruments gather data many orders of magnitude greater than previous methods. Telecommunication capabilities link researchers to computing facilities with vast capabilities and with data sources not constrained by geographical location. Data are available, not only in computerized databases, but also from sensing and other data gathering instruments. New analytical approaches are possible through graphics, color enhancement, animation, and other visualization techniques. With this ever growing capability, there is a need to help teach researchers to better use it, to develop better ways to store, retrieve data and to maintain its integrity, and to determine how to assure intellectual property rights in an electronic network.

Many of the significant research challenges today are interdisciplinary in nature, which requires expanding the circle of collaborators, as well as the range of information sources. A network of communications links will soon develop worldwide, to link personal computers, work stations, data bases, peripherals, and information utilities. Information systems will become transparent, and will facilitate the flow of information and meaning among people. Consequently, we will be able to focus on content not technology. Responsive expert advice, information, and solutions will be at our fingertips; we will find ourselves receiving more stimulation and excitement from the systems than the energy we put into them. We will become more purposeful, growing, and professional than we are now.

Notwithstanding these communications networks and large databases, the different methodologies, vocabularies, and cultures of individual disciplines create obstacles to efficient information exchange. Systems need to be designed to accommodate users who were not immediately involved in the original research. Merging existing data collections from different fields to perform analyses creates new problems.

It becomes extremely difficult to compare data that were derived using different techniques or approaches. Contributing to this problem is the lack of standards for data exchange formats which hamper the building of these multidisciplinary databases. The bottom line is that we must be prepared to import external information to support the internal R&D process, assure real-time delivery of information to support the transfer and transition of technology within the R&D community, and be able to export some results to remain competitive in the R&D arena, as well as to provide visibility to the organization.

These problems are further compounded by the growing internationalization of science. STI is being produced, enhanced, and stored around the globe. Single countries in some cases are acknowledged leaders in select scientific and technical disciplines. Many of the major research efforts involve worldwide data collection. Not only are a variety of disciplines involved, but scientists from around the world are participating in these efforts. The users in these projects are distant geographically as well. Global economies dictate that every effort be made to reduce unnecessary product and service development cost. Communications networks facilitate the exchange of ideas and access to remote databases, but there is still much progress that needs to be made in making systems more transparent and in developing common protocols.

Hence, the pace of data collection, the growth of international approaches to research, and the tendency to cross traditional disciplinary boundaries all cast a new perspective on earlier STI issues, and raise new challenges for effectively providing critical information to the end user.

The issues to be addressed and resolved are numerous, including the transparency of access to vastly expanded and distributed electronic resources; merging data from numerous sources; greater data validation; closer cooperation between the user community of scientists, engineers, and managers and the information system designers; the long-term viability of electronic data; and expanded resource commitments to support technologically advanced information systems; archiving large scientific databases; what STI should be retained, where datasets should reside; what formats should be used, how can they be physically maintained; and how to reduce dependence on specific hardware and software.

Notwithstanding the above issues, it will also be necessary to better understand the knowledge transfer process. It will be necessary to establish a research agenda to address these and other issues related to STI. Not only must information managers, but policy makers involved in the science and technology programs as well, need to understand the relationship of STI to the R&D process, namely, that knowledge transfer is an inseparable part of R&D. Innovation is a com-

&plex process composed of multiple and interrelated systems. A better understanding of knowledge diffusion by policy makers, R&D managers, scientists, engineers, and information specialists should result in better defining policy and programs that will enhance the productivity of the R&D community, and in turn enhance competitiveness.

As STI concerns move beyond the parochial interest of particular disciplines, as linkages occur with the networking community, and as the trends toward interdisciplinary research on a global scale become more pervasive, an expanded R&D user community is developing. The user community must voice legitimate concerns about both technical and policy issues associated with STI.

The user community must identify common concerns about STI access and in building systems that will accommodate the needs of future government scientific and technical initiative.

We are in the dynamics of technological pull versus administrative lag. Administrative lag retards the development and use of the new information systems and technologies. The industrial age from which we are departing needed us to be interchangeable cogs in a machine, turned-off and emotionless, mechanical, routine, controllable, and consistent. The new information age into which we are entering needs us to be growing, experimental, creative, enthusiastic, risking, and taking initiative.

CONCLUSIONS/RECOMMENDATIONS

* STI must be considered as an R&D resource, essential to the continued success and innovation of the R&D community. Not to be overlooked is the fact that STI has costs: costs in collection, internal and external communications, processing and storage, archiving and disposal, and in skilled staff used in all of the activities above. It is also noteworthy to mention that although STI is used mainly by the scientists and engineers of the R&D community, it does have value and is required at the policy level, as well as at the managerial level.

* STI management means more than simply developing more sophisticated information transfer systems; rather, it means providing the means to exploit both internal (corporate) and pertinent external (other governmental/industrial/foreign) information to meet the requirements of the R&D community.

* Practical steps must be taken to improve the quality, timeliness, and accuracy of information which will have an impact on the efforts of the R&D community. By recognizing problems and taking appropriate action to correct them, information handling costs can be reduced. Given the size of expenditure on information handling, even small improvements in the efficient use of information can result in very large potential savings.

* Effective use of information adds value to all the ac-

tivities of the R&D community. It means improved quality of information for more effective planning; more effective and efficient discharge of functions and higher quality of service; more accurate, more cost-effective information; reduced expenditure on the collection, communication and storage of unnecessary data; and a better focused information system investment.

* However, it is only in close concert with the R&D community that we can make the most effective use of information. It is only in concert with the R&D community that we can identify and specify the needs for information (including its content, quality, and timeliness); identify the most appropriate sources of information to meet these needs; identify the most appropriate mechanism for the delivery of this information; and establish procedures to allow data from many sources to be brought together to provide information at the point of need. In short, it is only with the help and cooperation of the R&D community that STI Programs can provide information services which are easily accessible, and allow users to find the information they need with the minimum difficulty and minimum intervention by skilled specialists.

* The starting point for information management must be an understanding of the users' business, its aims and objectives, and how these are translated into the functions it performs. It is then possible to derive or work out the total information needed to carry out this mission. It is important to note that the product which results from processing the required information is very important, and should employ language familiar to the users of the information.

* Through dialogue and support of the R&D community the differences between information need and provision can be investigated, and this investigation will determine where it is necessary to make up the deficiencies or dispose of the surpluses. The choice of delivery systems depends largely on who needs the information, how quickly, how frequently, and what they do with it. Exploitation of the information stock also depends on knowing what is available, and on being able to identify whether it offers a contribution to the requirements. The tasks are all continuous, requiring constant or periodic review, which is best done during R&D planning stages.

* STI management must become a part of the accepted culture of the R&D community, but it cannot become so unless adopted and accepted by it. A start should be made now to integrate one's STI Program into the R&D +infrastructure, including funding and operational control. Within the R&D infrastructure, we must obtain management commitment, review and produce policy reflecting our organizational status, allocate responsibilities, and set to work on implementing the true requirements of the R&D community.

CONTINUING ISSUES/PROBLEMS

Information Technology Issues - these issues address such things as advances in technology, next-generation information system problems/ issues, pace of technology development, development of computer networks, standards, military applications, and other technology issues.

Policy, Structural and Institutional Issues - these issues address changes in science, information policy issues, public/private sector roles and relationships, relationships among the branches of government, relationships among the technical stakeholder, and relationships among text, numeric, and image providers.

Legal and Ethical Issues - consideration of intellectual property rights and other ethical issues.

Economic/Marketing/Financial Issues - these issues address information as an economic entity, market creation, and funding and financing.

Issues of Content and Access - Coping with the increasing volume of information, storage and archiving, quality/comprehensiveness/currency of information content, access and dissemination, and security issues.

Attitudinal and Behavioral Issues

Education and Training Issues

International Issues for STI Access - these issues encompass such items as exchange of STI, transborder data flow, privacy/security, political/ economic/social considerations, acquisitions and mergers of information companies, pricing/ currencies, information to be exchanged,/transferred/sold, the balance of STI database use, language and translation, telecommunications, communicability/compatibility/standards, and copyright/data rights.

Acquisition I: Stock Acquisition Processes in Defence and Aerospace Documentation Centres

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1 INTRODUCTION

The acquisition of stock for any library is of course an essential activity, without stock there is no library and no service can be provided. It is sometimes difficult to find or create general rules because every library is different with different budgets, users, user needs and organisational aims. Some general guidelines will be of some help but most decisions rest with the library after weighing all the evidence.

Unless you are running a national library or a very large system it will not be possible to buy or acquire all that is published. Even if it could all be acquired there may not be the space to store all stock. You are then forced to be selective due to the limits imposed by your organisation. When stock has been selected it must be purchased at reasonable prices and at suitable speed.

This paper covers acquisition of library stock and includes selection and acquisition processes starting with the need for selection policies and moving on to establishing user needs, stock types, evaluation methods, purchase methods and stock suppliers

2 THE STOCK SELECTION POLICY

Most libraries spend large amounts of money on their stock and still cannot purchase all that they need or would like. Inflation, budget cuts and the increasing rate of publication add further pressure. The library can only buy a proportion of published material so selection from the vast pool of literature is necessary, some publications will not be bought but those that are must match user needs. It is vital that the library collection is balanced and matches the needs of users. Demand for book loans cannot always be satisfied, there may not be enough copies of a book in the collection, or you may disappoint some users by not buying their favourite book!

All such pressures mean that priorities must be set and material must be selected which will give maximum subject coverage and user satisfaction without overspending the library budget. This is a very difficult if not impossible balance to achieve. So many different pressures can lead to confusion and if one influence gains strength over the others then you may build a very unbalanced, narrow collection. A selection policy will help and will make sure the acquisition system remains on course by providing guide-lines and a foundation to work from. The policy will be determined by the character of the organisation and by users and their needs.

Policies vary from library to library, some may not be in written form, others go to great lengths. Whatever is created a firm policy must exist. For a detailed policy the aims of the library may be listed and the hoped for achievements :

- Run the collection within budget and cost effectively making maximum use of whatever funds are spent.
- The library is a focal point for information, users know that the library is a source of knowledge so stock gets maximum use.
- Make sure library users have the latest information and make sure that information is matched to the interests of the organisation.
- Eliminate duplication of research.
- Save the users time.
- Provide enquiry services and information services.

Be aware of the different types of stock selection:

a. Stock for a new library, starting with no stock at all.

b. Stock for an existing collection.

c. Stock to be moved to reserve stock.

d. Stock disposal or discarding

All the above types of stock involve a degree of selection, it is often thought that selection only involves the decision to acquire a book when in fact stock is being reviewed throughout its life, one item being compared to another and decisions made accordingly.

From this base the policy must give detail of how stock will be dealt with. It may be decided that the collection will just react to requests which come from users. On the other hand details may be given of the different parts of stock (reference and loan, periodicals, reports, newspapers etc), the balance of the stock, subjects which will be collected, methods of gathering information for selection etc. Some academic libraries go to great lengths with their written policy specifying exact targets for size of collection, subject splits etc. It is worth including discard policies too. No library has unlimited space, one way of creating space is by an active discard policy which also allows for the disposal of old, unused stock. It is quite difficult to write a discard policy but the process should at least be acknowledged and carried out.

Staff responsibilities may also be included. The organisation may place demands upon the library or the library may exist for a particular function. A National Library's policy will presumably specify that everything is collected. A Defence Documentation Centre may be tasked with collecting all reports published in the Nation's MOD. A Company library may be the archive for all company produced reports and must hold them forever. The policy must include any such fundamental points. Every selection policy will be different as every library is different but it is important that every library has a policy. The selection policy will help the library to cover all relevant areas, it sets standards and informs users and management of library policy. In the longer term the policy prevents a bias setting in to the collection and it ensures there is some continuity to the selection process. The policy may also be used as a training aid and helps budget allocation between different types of stock.

The policy should be printed and it should be distributed to all library staff particularly those involved in selection. Full discussion of the policy within the library must take place, views should be noted and suggestions for changes added to the policy. Remember different members of staff will have various inputs to make to the policy as they will be involved with different aspects of day to day work. A reference librarian will have views on stock as will a literature searcher, both will be slightly different and remember too that such staff have the front line experience of day to day contact with users and subjects demanded. It may be useful to involve users in the creation of the policy. Keep the policy flexible and make sure that everyone who needs to see it does so. The policy must be kept up to date so any changes in day to day procedures should be reflected in the policy.

If a policy is well designed, thought through, circulated to library staff and kept up to date, then a sound foundation for selection will be built.

A good selection policy cannot be formed until a good picture of user needs has been created.

3 SURVEYING THE ORGANISATION

Any library collection or service must be accurately matched to user needs. If the collection does not fulfil user requirements it will not be used and it will not survive. In many cases this could mean closure of the library or a reduction in funding. All libraries serve a particular clientele - a company's employees, undergraduate students, research scientists and so on. Each group of users will have different demands as to subject and level of library stock.

To create a balanced and effective library collection user needs must be known, surveys are the best means to discover what is needed. The survey does not need to be a complex highly organised affair but some fairly detailed study must be done. Surveys will confirm the collection is functioning correctly, give ideas for new stock additions or revisions and will keep users involved with the library. The more the users are involved in the process the better the service will be, feedback is still very very important in all aspects of our work. If the library staff are not constantly seeking and getting feedback they are failing in their jobs. Again this need not be a formal arrangement, it is amazing how much can be picked up by casual contact or informal chats with users and non-users.

The following suggestions will apply both to the established library and when a new collection is being built. The survey will try to build up a detailed picture of the organisation, it's people and their interests.

Look at the organisation structure and learn it in detail, it is vital to know who is who and who does what. What are the basic divisions in the organisation? Are they divided by function? By subject? Who are the managers? How does the management structure work? Learn the relevant names and subject interests. Once the formal structure is known talk to people to make sure a correct picture exists of the structure, personnel and subject interests. Of course talking to people will also show how the system really works rather than how the formal structure thinks it works! In any department how many people are managers, professors, researchers, engineers, undergraduates, post graduates, sales personnel, apprentices, trainees etc. The split of personnel is useful, it will help determine the level of stock held as well as subject - an apprentice may need a different level of book to a professor.

What are the aims of the organisation? What are the aims of the library? Do the library aims serve those of the organisation? If your organisation is a library their may be a demand that particular types of document are collected or particular groups of users. A defence documentation centre will probably be charged with collecting all MOD material.

If a new collection is being developed users or departments can be asked for suggestions for stock and standard works.

No library or information worker can possibly know everything about every subject covered in their library so developing a close relationship with users provides a pool of extra experts who can be consulted at any time to supplement subject knowledge in the library or to advise on potential purchases. The closer the relationship the better as mutual trust will allow straight talking and accurate feedback. These second opinions help build a good collection which should be well used as it is tailored to the users who may have greater commitment to the collection because they are involved in its' creation.

The counter to this is that to be totally user driven can be dangerous, the users knowledge and horizons will not be extended if the library merely responds to their demands. Additional input must be made to widen the knowledge base of the library.

Existing library stock can also be surveyed to provide measures helpful for:

- Evaluating stock for discarding or move to reserve.
- Finding popular subjects.
- Finding subjects no longer of interest.
- The need for duplicate copies.

Constant or occasional surveys on the use of existing stock are an instant measure but be aware that the loan of a book or journal does not imply the item is actually "used". The user may not find the information required, one book may be more informative than another etc. Even so issue counting is one measure worth using but note the limitations. Issues should be counted by department or groups of user. Look at issues in relation to total stock to show the percentage stock use. This figure used over time can be used to show the effectiveness of selection policy provided use is not affected by other factors. Look at issues related to dates of books, if older stock is not used perhaps this should be moved to reserve stock or discarded. Issues correlated by subject can also help budgeting if your selection policy specifies spend by subject area.

Methods of counting are obvious, an automated system should be capable of producing relevant data, a manual system will allow counting of issue slips or look at date stamps on stock itself. Coloured spots placed on books loaned or returned can give an instant visual indication of use.

Look at inter library loans to discover any recurring subjects or books which should be considered for purchase.

Analysis of searches conducted by information staff will give useful data.

Journal circulation details also show use patterns.

Remember the mere counting of issues or circulation does not imply "use" of material, the book may not be of interest to the user once issued and users may read material in the library so no issue will be counted.

Further methods should be tried to gain a clearer picture and to complement data gathered by issue counting.

Questionnaires could be used, they must be well designed and not too complicated to complete. An observer in the library can watch the behaviour of users and note accordingly, this can be expensive and may disturb some users!

Users may be asked to keep diaries of their library activities and stock use. This should be designed to use the least amount of user time. Users also tend to leave books on tables or the library may demand that no users do any re-filing. The items left out can be counted and subjects noted as before. Interviews can also be conducted as users leave the library.

A reasonable picture should emerge as a result of surveys of existing stock, there are dangers that the survey may be biased as you are looking at existing stock rather than possible stock. It is important to get outside the library and talk to people, get feedback and encourage users to suggest new books and give their opinions on how good your stock is. A combination of all methods will produce fair results and you should have a usable picture of your organisation, its users and needs

4 STOCK TYPES AND EVALUATION

Once the foundations for selection are laid the next step is the actual selection of stock, how to find out what is published and how to decide which items to buy. The following list is arranged by type of publication, some elements are common to a number of types, some apply to one only.

Many items of potential stock will select themselves, it will be instantly obvious that the item should be purchased. It may be the only book written on the subject, the author is well known, it is a new edition of a standard work etc. In most other cases though a little more thought may be needed.

4.1 Books

There are three main methods of finding new books:

- Bibliographies
- Publishers publicity
- Reviews

Bibliographies are an important tool for new book selection and retrospective acquisition. The first type to consider is the National Bibliography which should list all material published in the Nation. This is a very comprehensive source and does, of course, cost some money. There can be some delay between the publication of the book and its' appearance in the National Bibliography. For scientific and technical libraries this delay may be unacceptable, nevertheless even in these libraries the bibliography could be used as a checking tool to ensure all relevant items have been purchased. The bibliography may be too comprehensive, if the library deals with a narrow range of subjects these may form a tiny part of the complete bibliography and money may be wasted if only a small fraction of the work is used. Talk to other libraries and see what they use.

There are numerous subject bibliographies which cover special disciplines, they provide a good overview of a subject but again are of most use for retrospective acquisition.

In most subjects there are publications which survey progress "Reviews of Progress in....". These are a valuable source of newer references.

Look at lists of references in some of the standard works in the field of interest, these should yield some sources.

Online sources may be useful, the British Library's BLAISE-LINE for instance or some of the Bowker databases and publications.

Publishers publicity is advertising material from the book publisher, it will provide some idea of the content of the book but the publisher is trying to sell the book so the presentation is not likely to be impartial! This may be the only information available on books to be published. A variety of lists is available:

- single-sheet flyers about one book or a very select list.
- subject lists
- complete lists (of everything they produce)
- annual lists (current or past year)

Keep a collection of publishers catalogues. Find out which are the important publishers in the field of interest and ask to be put on their lists, they will be only too pleased to send publicity, you will be overloaded in no time!

Price details on publishers publicity may be inaccurate particularly if they are giving advance notice of publication. Only commit to purchase when the price is definitely known and confirmed.

Reviews appear in numerous places. Always keep a look out for book reviews in any publication entering the library. Reviews appear in newspapers but probably not of books of interest to us. For our libraries reviews in journals are probably the best. Many journals have specific review sections and some journals are devoted solely to reviews. These reviews will be authoritative, impartial and unbiased as they are not advertising books for sale. A review is still a personal opinion and a negative review should not necessarily lead the library to reject the book. Form your own opinion, the review may just alert you to the existence of the book. Unfortunately reviews can be late so by the time the review is published the book has been on the market for some time and may be out of date.

Learn the reviewing techniques in the field of interest, which are the important publications? How up to date are they? Who are the reviewers? How often are reviews published?

Reviews are probably best used as a checking mechanism just as with bibliographies; to make certain nothing important has been missed.

Some book supply agents provide an alerting service. The library registers subject interests with the supplier who then sends written notification of new books or the books are sent on approval. A fast and up to date method if the supplier is well organised.

Users are always a source of ideas, encourage them to give you suggestions for stock. Looking at reservations for books will show popular requests from users. Users attend conferences, may be members of various societies or talk to colleagues. All such contacts may be useful in gathering new book recommendations which should be passed to the library.

Once the book has been discovered some further work must be done to decide it's suitability. What is the price? Can the budget afford it? Is it expensive for the type of book? (you may be happy to buy a book which is more costly than average but which is the only one on the subject). Do not rely on publishers advance information for prices. How old is the book? Is it up to date? How up to date are the quoted references in the book? Is it a new edition of a book already in stock? If so, how different/updated is the new edition? Is it merely a reprint of a well known classic? If so do you already have a copy in stock? Who is the author and how well known? An authority in the field? What type of user is the book aimed at? Researcher? Undergraduate? The information in the publisher publicity cannot be relied upon to define the level of the book. Look at the foreword or introduction of the book. Will the text and it's complexity suit the users? If there are several books on a subject it may be possible to select the best written, if there is only one advanced text then it will be purchased regardless of style. The users will make allowances for any deficiencies in style if the book is important and provides good information. Is the book well indexed? A poor index inhibits proper use.

There may also be considerations of size, will the book fit your shelves? Oversize stock? Is it a paperback? Can you buy in hardback which will last longer?

A blend of all the above techniques should help to produce a balanced an up to date book stock. Note once again the importance of the users.

4.2 Journals

Journals or periodicals require different selection methods. The journal runs for many years and may cost a great deal of money, a decision to start taking a journal will commit the library to long term expense. In fact many library journal selection policies tend to spend time on selecting journals for deletion from the order list rather than selecting new titles. Inflation and budget cuts have led libraries to make reductions in journal stock and to pay great attention to use and holdings of journals. As technology advances there are more journals available with ever more specialised titles for smaller groups of readers, this coupled with budget restraints makes journal selection a major art!

To find out what is available locate the key journal publishers and make sure the library is placed on their mailing lists. There will be single sheet publicity runs plus select listings by subject. Read the review journals regularly and also scan the review sections of specialist journals. There are guides available which may help, Ulrich's International Periodicals Directory will help locate key journals.

Look at the abstracting and indexing services taken in the library and also at online searches conducted. Are there any journals appearing regularly which are not taken? Are there any new journals appearing in these sources? Some people find citation indexes a useful measure of journal popularity. National Bibliographies may list new journals. It would be worth examining inter library loans as a further indicator of potential purchases. Are some titles appearing regularly?

If a new relevant journal is published it is vital that it is acquired as quickly as possible, otherwise the first few volumes or years may be missing from the library holding. A decision may then have to be made whether to buy the back issues but the journal volume may not be available as many journal issues go out of print on their day of publication.

It is dangerous to buy a journal completely unseen, it may be unsuitable. Contact the publisher or supplier and ask for sample copies of any relevant title to get a fuller impression. The sample can then be circulated to interested users who may be persuaded to give their opinions on the journal. If these are favourable it is worth applying for a subscription assuming the budget is healthy. Run any new subscription as a trial subscription, the library and users will view the first year as an approval period. If the journal is still seen to be useful at the end of the year then it could become a permanent subscription. By running a trial subscription the journal is given a thorough review, the sample copy may have been a poor issue of little interest to your users and if the journal is new the quality may change (for the better or worse) as the journal settles into routine publication.

Every year at renewal time the complete list of journals should be reviewed. Every title should be checked:

- By journal circulation/contents page use.
- By observation of use by users in the library.
- Number of requests for access to journal or photocopies taken.
- Is the journal referenced often in searches conducted in the library?
- Has the price increased/decreased?
- Look at use of journal in any bulletins or current awareness services.

Some price increases may move the journal outside acceptable budget limits, from time to time a price increase can be massive and this alone may de-select the journal. Remember price variations may be affected by currency fluctuations for foreign journals so some price changes may be beyond the publishers control. The rate of annual inflation for journal prices also tends to run a few percent higher than normal inflation.

How frequent is the journal and how up to date will it be? Some journals are produced with the intention to publish quickly others may be more relaxed. In any case the information in a journal is likely to be more up to date than that of a book.

This whole process should not be as difficult as it sounds, some single feature will normally make the decision obvious; high price, decrease in users etc. Also during any year library staff will develop opinions about particular titles, these should be heeded. Yet again, remember to consult users about any titles getting close to de-selection.

There are many types of journal, some carry news items which date almost instantly, some are more learned and their information is valid for many years, others may be highly theoretical with a very small target readership. When journals are reviewed or compared make sure that the nature of the journal is known so that any comparison is fair and sensible - a theoretical quarterly cannot be compared directly with a weekly newsletter, they are different and you must establish which the users would prefer. This effect will also be reflected in the users, the

newsletter may be very popular with many readers, the theoretical title may only have one or two readers but these few are no less important than the larger group (particularly if the journal is the only one in its field).

Detailed knowledge of existing stock is vital so that new titles can be evaluated easily for replacement or supplementing existing titles. User feedback is essential.

4.3 Conferences

Conferences publish up to date information quickly and some scientific personnel view conferences as equally important to journals, others see them as slightly inferior as they may be of poor quality with poorly refereed papers. They can be a nightmare for stock selection as the forms of entry in listings vary, publishers change from year to year and titles change. Many conferences have limited print runs and may well be out of print by the time the conference is held or when it is quoted in listings.

Some conferences are published in journals as special issues or otherwise, it is therefore possible to duplicate conferences in stock with great ease!

If a new collection is being built users can be consulted as a first step. Many will have knowledge of regular conferences relevant to their field. Some may be members of professional societies which organise conferences and may give useful pointers.

Contact conference sponsors and ask to be placed on their mailing lists for forthcoming conferences. There may be some organisations that publish conferences which are so important to library stock that it may be worth setting up blanket or standing orders for all their conferences.

There are online and bibliographical tools which should help. Aslib produces Forthcoming International Scientific And Technical Conferences. The World Meetings series of publications should help and a Conference Index database is available on BLAISE. Many journals will list forthcoming conferences or conference publications.

It must be stressed that speed is of the essence as conferences go out of print so quickly.

4.4 Reports

A diverse library material with an infinite variety of formats, layouts and numbering systems. This diversity can make reports very awkward to deal with but they are a very important part of a special library collection and with some libraries (Defence Documentation Centres for instance) they form the majority of the stock. In such cases all stock is in effect "unpublished" as reports are not produced through normal publication channels and may be very limited in distribution, most of the stock is therefore "Grey Literature".

Internal reports may be produced by personnel in your organisation. There may be a policy that all internal reports must be deposited with the library. Does such a policy exist? If not, should there be one? A decision should also be reached on archiving. Should everything be kept forever? There may not be room to keep all the material but if a copy of a report cannot be found in the library at source of publication then there is very little chance of finding it elsewhere. In my own organisation we do keep a copy of every internal report forever. If a central archive guarantees to keep everything there is no need for multiple archives with each department attempting to store all reports it produces.

If internal reports are collected and stored there is very little selection involved, but checks must be made to make sure everything is arriving as it should. Look at any annual reports from laboratories, departments etc. Reports may be mentioned on work completed or in progress, check that these reports are in the collection. If the library is successful in obtaining all that is published internally it may be necessary to select from the material sent. There is no guarantee that all material will be needed for the collection, some selection may be needed but be careful and remember the library may be the only long term store for the material. It is better to err on the side of caution and keep anything of the remotest interest.

External reports are more awkward. The definition of a report covers a variety of formats. From a commercially available market research report to a report written by a scientist on a highly specialised subject, highly classified and unlikely ever to be widely available.

The report is popular because it offers a swift method of disseminating information and the originator can control who sees it. It has grown in popularity because of these controls but they make it a difficult medium to find out about, find a supplier and acquire. Because many reports are classified they may remain underground and impossible to acquire without the relevant need to know. This is the very nature of much grey literature, never quite seen and no central control, a variety of formats and non-standard numbering systems.

Important reports can be obtained on an exchange basis with other organisations or on standing order from relevant agencies, with both methods many reports are likely to arrive and some may be discarded. Make sure such reports are central to the collection otherwise time and money will be wasted.

Relevant agencies and bodies can be located and then make sure their announcements services are taken by the library. NASA in the USA produces Scientific and Technical Aerospace Reports (STAR). This is also accessible via the NASA database on IRS. Relevant reports can be located and purchased with reasonable ease from such publications. Another example for the USA is NTIS (National Technical Information Service), also available as an online database on a number of hosts. In the UK we have British Reports Translations and Theses which alerts us to items held in the British Library and can be used as a selection aid. The SIGLE (System For Information On Grey Literature In Europe) database is produced by the British Library via BLAISE and can likewise be used for selection.

Users still have an important role as they may suggest agencies of interest or titles of reports. Newspaper or journal articles quite often turn up analyses of new reports, if the library scans these some useful items may be found, users can often find very obscure references by this method. A recurring problem with these references is the accuracy of the reference provided particularly by newspapers. The information is often very scant and much time is wasted trying to verify the reference.

Watch the technical press closely. For instance Aviation Week And Space Technology may show who has got new contracts, or may report progress on projects. This could generate reports of interest to the library and you will know which organisations to be monitoring.

Many agencies produce alerting bulletins. The national Defence Documentation Centre will produce some form of bulletin or listing of new accessions, different bulletins may be available depending on whether the requesting library represents industry or government.

4.5 Standards

The number and diversity of standards is alarming and controlling this stock needs care. Standards are of immense importance in the manufacturing/commercial world as contracts may be gained or lost on the existence or lack of a standard. In the defence field standards ensure that ministries receive equipment to the required quality and that common equipment can be run between different nations.

Users may bring strong demands for standards, these may be driven by their own customer or contract demands that particular standards are used. A good collection of standards available in the library will contribute greatly to the quality of work and products produced by the organisation.

As with reports there is no international agreement on the layout, format or numbering of standards. Although many standards are known the world over this area can be very confusing and users can make matters worse by quoting out of date or partial numbers.

Standards may be National or International and Defence standards are also available which may have a need to know qualification.

The only way to keep a standards collection up to date is to receive the relevant yearbooks, lists and indexes from the issuing organisations. The national standards body will be of great importance for supply of national standards and also for advice on where to go for other standards. It may act as an agency for other issuing bodies so you may be able to obtain other types of standard. Contact your national body and join it if there is membership you will then receive lists and notifications of changes as they occur discounts on publications may also be on offer.

New standards should be assessed by subject and included in stock if they match local needs. Users can help as they will have knowledge of contracts and customers. Amendments must be obtained if a standard is already in stock and in use. Every standard must be up to date or the user will work to incorrect data perhaps losing the contract or producing inferior products. If copies are held by users they must also be informed of any amendments or withdrawls to keep their collection up to date.

The international standards work on the same basis but you may be able to obtain these through the national standards body. International standardisation is important, but it is producing more copies which must be held in stock. For instance many countries adopt ISO standards in entirety but libraries will have copies of both the ISO and the relevant national standard. No user will believe that the two are equivalent, the originals must be seen. There may be a time lag between the issue of the ISO and when the nation decides to adopt it. The ISO must be purchased in the certain knowledge that national standards will follow it eventually. This tends to increase expense and the trend is bound to increase. Make sure you are on the relevant international standards lists.

Defence standards have amendment and listing services, once more make sure you are on the right lists.

Standards acquisition tends to be driven quite strongly by actual user demands since they are the people who may have to conform to the standard. Strange standards are forever being requested as a contract calls them up, they will be unfamiliar to user and library so cultivate your contacts and get to know your national standards body and its' services well. If agents specialising in standards can be found use them and learn what they do.

4.6 Non Book Materials

A range of formats are covered in this area from audio tapes to microforms and video tapes. Space does not allow a full discussion of this stock but some basic features will be covered.

The assessment of any item can be on similar terms to other stock making sure the subject content relates to user needs etc. Reading, listening and viewing equipment must be available in the library if this material is acquired. There is no point in building a collection if it cannot be used. The equipment and format can often be a barrier to users and may inhibit use strongly.

Microform is the most important non book medium to special libraries, either film or fiche. The obvious benefit of microforms is space saving and many libraries buy in order to conserve limited space. Most journals are now available on microfilm and it may be worth considering if long runs must be kept and space is limited. If hard-copy and microform are acquired at the same time there may be some form of discount from the supplier. The decision on format for journals must be based on use, the lesser used titles would be appropriate for microfilm but heavily used material on film would be very unpopular with users.

If the library holds archive copies of internal reports which must be kept forever, this may be a case for filming, otherwise valuable space may be filled with archive copies which are only used occasionally.

Many reports, conferences and theses appear in microform because it is cheap to reproduce, mail and store. When an order arrives it may be on microform even though not ordered as such. Some conferences sell out of hard-copy very quickly and may only be available on microform.

Overall the selection processes involved are identical to other stock types, storage and reading are different and the main decision is what should be held on film rather than hard-copy once a particular item has been agreed upon. It can be argued that the best use for microforms is for archival purposes and for lesser used material which you would still like to keep.

5 SOURCES OF SUPPLY

Once stock has been selected it must be acquired as quickly and cheaply as possible. The main methods of acquisition are:

- Free supply or gift
- Exchange
- Purchase

5.1 Free Supply or Gift

Gifts cannot be requested but they are still a means of acquiring stock. Other libraries may be discarding material or users may be clearing a laboratory or office. These and other sources will produce potential stock but the library should receive such gifts on the understanding that anything not required may be thrown away and that there is no obligation to keep material for ever. Educate

users to consider the library first whenever they wish to dispose of material, a fair amount of useless items will appear but a proportion will be useful, particularly internal reports which can be used to fill gaps in library stock.

A publication may be completely free, a letter or order to the publishers should secure a copy. The publisher may require some proof of genuine interest in which case the letter should explain the need for the publication. At the same time a request to be placed on lists for other relevant publications may be worthwhile.

Numerous free journals are available, some are absolutely free, others are on "controlled circulation". For the free journals a letter or order should be adequate. The controlled circulation journal demands that recipients are all qualified in some way by working in a particular field. Some are not available to libraries so the library must find users who are willing to receive the journal and pass it on to the library. Look at the form and decide which option will work. The quality of information is not compromised just because these journals are free, most contain articles of high standard and many are essential reading in their field.

5.2 Exchange

Exchange can save significant funds provided the correct approaches are made. If the library or parent produces a publication or journal this can be used as a bargaining device. If you wish to acquire a book or journal from another organisation and your library or parent organisation produces books or journals you may succeed in setting up an exchange agreement between the two organisations. Complete series of publications and runs of journals may be acquired this way. To set up an exchange a letter should be sent explaining your proposal exactly; what you would like and what you can offer in exchange. An exchange can save administrative time, money and foreign currency dealings if the material comes from overseas. Exchange of reports series may be agreed between companies, organisations or nations. Remember this may lead to a large influx of material which must be sifted and checked for relevance to stock.

Review exchange agreements from time to time to make sure your organisation is sending material as agreed and that you are receiving material as promised. Both organisations should receive equal benefits. One publication may decrease or increase in value or may cease publication, there may be new publications not part of any agreement. The review will check that value is still obtained, if it is not then the agreement may be modified or even terminated in the extreme.

5.3 Purchase

The first major choice every library must make is whether to use an agent or to order direct from the source. There are many instances when there is no option but to buy direct since some publishers do not deal with agencies. Some learned societies offer discounts to members, these may not be available if purchased through an agent. Check with users if there are memberships of any learned or professional societies which offer publications at discount to members. It may not be ethical to ask a member to buy at discount on behalf of the library, some organisations view corporate purchases differently to individual subscription. Nevertheless there are some organisations which have no such problems so these are a potential source of cheaper publications. The library may be eligible for membership or such organisations, join and use the discounts.

Another reason for direct purchase is the early order discounts offered by some publishers who demand early and fast orders to attract the discount. Check the price when the document arrives, there are sometimes discrepancies, if there are then be forewarned next time that publisher advertises!

If everything is to be ordered direct then you must keep accurate track of every order, arrange payment item by item and arrange foreign currency transactions (which attract additional expense themselves), all contribute to a heavy workload. An agent will remove much of this work and payments can be made in the home currency. The library will also benefit from the economies of scale of the agent. The agent specialises in document supply and will have sophisticated systems for ordering and chasing plus their own special contacts. Any negotiation with publishers is better done by an agent because they will have greater leverage in getting things done particularly if the agent handles large amounts of a publishers' output. One lone library against a large publisher may have little success in chasing a lost or late order. The power of the agent, who may have several customers with the same problem, is much greater. Agents also develop close contacts with publishers so they know who to talk to, the library may not.

The benefits of using an agent are enormous and I recommend that whenever possible an agent should be used.

Various services are offered by agencies:

Blanket orders

Standing orders

Approval plans

5.4 Blanket Orders

If a particular type of publication is needed such as reports on a particular subject, all books by a particular publisher or any other broad criterion then the agent should be able to offer blanket orders. As soon as a publication matching the specification is published it is sent to the library. Payment must be guarantied by the library, the agreement is that everything will be paid for. Specialist stock can be built this way and it eases selection work locally. Monitor the system closely because emphasis can change or library needs may alter, irrelevant material may start arriving on which payment has been guarantied. Change the specification or cancel the blanket order if it is not working.

5.5 Standing Orders

If the library buys a publication every year with very little need for deliberation or selection; a very important reference work for instance, then a standing order may help. The document is sent by the supplier as soon as it is available, the library again guarantees to pay upon receipt. Selection work is saved again and important items are not forgotten. Allow for the cost of standing orders in budget allocations and review from time to time to make sure material on standing order is still needed.

5.6 Approval Systems

Many agents will send documents to libraries on approval. The document can be examined, evaluated and if not required it is returned. If the document is required the library pays the agent and keeps the book. This is an excellent method of evaluating stock but treat it with care. Make sure items on approval are well looked after, if they return looking used or worn then the agent will be unhappy since they may not be able to sell a worn copy. A reasonable percentage of documents, should be bought otherwise the agent will see no benefit in continuing. Check that any approval system offered is on true approval, some so called approval systems do not work on sale or return, if the item is not required it is returned but the agent issues a credit note which ties the library to buying from them in the future. If a number of items are returned the credit amounts can build to a substantial sum which could be working better in the library budget or spent on other stock.

Some publishers will not allow approval systems when the documents are very expensive for instance. Do not blame the agent if they cannot offer some items on approval.

Agents may run Approval Plans whereby the library specifies detailed criteria for selection, by subject for instance. Everything on that subject is then sent on approval, payment or return as before. This combines savings in selection time with the convenience of an approval system. Check the system frequently for relevance and efficiency, like standing orders funds may be wasted if no checks are made.

Subject listings can also be requested from some agents. The library specifies subjects of interest and the agent sends notifications of new books as they are published. The library can then choose to order whatever is of interest. Some of these systems are sophisticated with very detailed selections available. Online access is provided by some agents allowing the library to check orders, subscriptions or chase items.

6 JOURNAL AGENTS

Journals need special treatment and a good agent is worth finding. A journal agent will deal with payments in foreign currencies, will place orders, chase missing items, and provide listings and statistical analysis of the library subscriptions. One single payment in one currency per year to the agent will be the only financial transaction needed. The savings in library staff time and simpler local tasks can be considerable.

Most agents can offer a range of services so make sure the scheme selected suits the library.

How should subscriptions run? It should be possible to specify when the library would like to pay and how the subscription year will be organised. All subscriptions could run from January to December or subscriptions could start at random points through the year. Most agents will allow one annual payment or monthly payment. Discounts are sometimes offered for early ordering but look closely at any offered, are they really cheaper than other agents?

Compare notes with other libraries to find out which agents they use and how they find the service.

6.1 Selecting An Agent

If there is a nearby bookseller or newsagent it is a good idea to order a few items with them, daily newspapers and some weekly popular journals perhaps. A local service can be very useful in an emergency and good contact for daily items can be helpful if problems occur.

It would be unusual if one agent dealt with all types of stock for the library, agents have different specialisations. Some try to cover everything and may provide poorer service as a result. Others work in special areas, they may deal only with books, they may specialise in standards or they may be experts on obscure reports series.

Several agents will be used by most libraries each being used for their specific expertise. This has the added advantage that the load is spread, if one agent goes out of business or service deteriorates then contacts are already available with alternative suppliers and their quality of service is known.

Find out from other libraries who the agents are, make contact and ask about services and what can be offered. Circulate a list of publications which are needed by the library and ask for price quotes for supply. For journals it is a good idea to send a list of 20-30 titles and ask for last year's prices. This will give the best means of comparing a number of agents, all the prices will be known and fixed and no excuses can be made about unknown publisher price adjustments. The only way to find the truth about agent performance is to place some orders and review the quality of service.

There are a number of questions to be asked before proceeding to place any orders. If the answers are misleading or difficult to understand then use another agent:

Will the agent run an approval service or plan? Is it a true approval - sale or return or are credit notes issued against returns?

Are any discounts offered? Are they available on all purchases, to members of learned societies etc. Look very carefully at all "discounts", some are non-existent. Every agent must make money somehow and when discounts are offered the agent must be cutting into profit margins, services must suffer if this happens. I have known cases where the agent marks up the price of all items and then offers a discount, this is dishonest but it can happen. Compare costs with other agents and libraries and it should be possible to find who is telling the truth. There are likely to be surprising variations in cost for the same item, if this becomes confusing then it is sensible to compare agents on quality of service, it should then be possible to find a balance between cost and service.

Charging Structure Every agent must make money to survive, this is achieved by charging commission or deductions form the selling price of every item. Ask how the agent makes its' money, if there is no answer or the answer is confusing, go elsewhere. The agent should be able to provide a clear, concise statement of how their money is made. An agents commission is often acquired by the agent obtaining a discount from the publisher, the agent charges the customer the normal cover price, the agents profit is the difference between discounted price and cover price. If the publisher does not give a discount the agent charges the customer for cover price plus a handling charge, say 10 percent of cost. This is a straightforward and easily understood system. Note that the discount from publisher is used to give the agents'

markup, it cannot really be passed on to the customer although the customer pays the same as if purchased direct. Because some publishers do not offer discounts be very wary of any agent offering discounts on all publications. Question agents closely on this, in many cases they are offering nothing, in others they may be discounting an already marked up price.

Compare prices between agents, some results will amaze! A list of journals or books sent to several agents asking for prices will show the best deal. The cheapest may not give the best service. The charges made by the agent pay for services, how good are they? Compare notes with other libraries to discover best costs and best services.

What services are available? Standing orders, blanket orders, listings of subscriptions, statistical analysis of purchases etc.

How does the chasing system for overdue documents work?

Are there any types of document the agent specialises in?

Does the agent have any overseas offices to ease foreign material acquisition?

How good is the agent at acquiring foreign material?

Does the agent provide any check in services? Some will receive ordered documents at their premises, check arrival and forward to the library. Some will add book labels, covers, and library details before despatching the document. This may introduce delay but will save more library staff time.

How fast is response to an order? Is response or attitude good to queries?

How flexible is the agent with subscription years for journals? Can they match your requirements for payment times?

Who pays for postage or carriage, the agent or the customer? How much are these charges?

Does the agent have any exclusive deals with publishers or document sources?

Once an agent has been selected the best way to evaluate is to order some items through them. Monitor the service and form an opinion on quality of service, is it adequate for the library? When evaluating agents it is only fair to provide a selection of items for them to obtain. If they are only given obscure, difficult to find material they may be very slow but so would any agent. Agents make their money by handling a mixture of straightforward and difficult to obtain items. A balanced selection of trial items would be fair to both parties.

If satisfactory service is provided by an agent then the library may stay with them for many years. If service deteriorates give the agent a chance to rectify by warning them. If there is no improvement do not be afraid to change agent, the very threat to move can often bring about a great change in the current agents service but if you do move it is not as painful as many would think. Even with a large order a change of agents is not a great problem. The new agent will carry out all the difficult work and will try very hard as they want the business. As you enter a relationship with a new agent be sure to mention that you will leave if service deteriorates. I believe libraries have been guilty in the past of forgetting that the agent/library relationship is a commercial transaction. Many libraries have continued with the same agents for many years never bothering to look at services and value for money. Some agents grew complacent and did not look to improve services. The whole position was perhaps one of lethargy, if libraries fight back, demand good services and keep agents on their toes then the position improves, it should be viewed as a commercial transaction with commercial pressures motivating libraries and agents.

7 CONCLUSION

The various elements of selection and acquisition have been discussed with suitable pointers for further action. It is a complex area which is fundamental to the very core of the library collection and matters become more complicated by the different varieties of stock and their characters. In addition to the selection processes we must remember the crucial importance of feedback from users. This has been mentioned often through the paper, this was intentional as it is central to acquisition activities. No user contact = an irrelevant library = no use = no library. Through all of these activities the user must be consulted. Other libraries have also been mentioned, keep in contact with fellow library and information colleagues in other libraries and compare notes about all aspects of acquisition.

With a combination of all these activities the best sources, the best publications, the best agents and an effective collection will be found.

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ACQUISITION II : PROCUREMENT, ACQUISITION, AND MAINTENANCE OF CONFIGURATION MANAGEMENT DOCUMENTATION IN SUPPORT OF A CIS SYSTEM.

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1. SUMMARY

The objective of this paper is to outline the procedures used by the NATO Communications and Information Systems Agency (NACISA), when acting as Host Nation for the implementation of a communications and information systems (CIS) project.

The paper will address the procurement, acquisition and maintenance of configuration management documentation required in support of a CIS. For the purposes of this exercise, configuration management documentation is defined as specifications, handbooks, drawings, and records that pertain to the design, performance, installation, operation and maintenance of a CIS (see Fig. 1). Emphasis will be placed on the activities involved in the acquisition of technical handbooks and drawings required for operation and maintenance, and will briefly outline the various end-users requiring this data.

In addition, the procedures currently used to maintain this documentation during the in-service phase of a CIS will be described, and the present storage media utilised and future automation plans will be addressed.

2. INTRODUCTION

NACISA's mission and role is to provide central technical planning, design, systems engineering and configuration control for the NATO Integrated Communications System, ACE ACCIS, and for those NATO CIS in support of C3, to ensure integration of all related systems and elements thereof into a coherent, logical and interoperable entity. The Agency also implements authorized projects to the point where completed elements of those projects become operational, and provides approved levels of Post Implementation Support (PIS).

For project acquisition, NACISA utilises the NATO Phase Armaments Programming System (PAPS) methodology which specifies that eight discrete phases are involved in a project life cycle. These phases and the activities involved are depicted in Figs 2 and 3.

Fig. 4 depicts the PAPS phases, plotted against the activities carried out in the acquisition of a CIS System, and the participants involved in this acquisition processes.

3. PROCUREMENT AND ACQUISITION OF CONFIGURATION MANAGEMENT DOCUMENTATION

3.1 Phase 3 : Type A Cost Estimate (TACE)

During Phase 3 (Feasibility) activities, the TACE is generated. This is a broad planning cost estimate covering such basic data as title, location, history, military justification, project description, schedule, logistics concept, infrastructure and operation and maintenance costs. At this stage financial provision is made for the acquisition of technical documentation.

3.2 Phase 4 : Type B Cost Estimate (TBCE)

During Phase 4 (Project Definition) activities, the TBCE is generated. This is a detailed cost estimate of all elements which will be involved in the project. Provision is also made for the acquisition of the necessary technical documentation packages. The coverage of the documentation packages must be consistent with the logistic support concept for the project which will specify either contractor or NATO Maintenance of the fielded system. Consequently, the logistics support concept determines whether a partial documentation package is acquired i.e. site operator and maintenance handbooks together with the associated installation (as-built) drawing package, or a full documentation package encompassing the above, together with depot maintenance handbooks and

engineering drawings will be procured (see Fig. 5). Phase 4 is concluded with the generation of the system specification.

3.3 Phase 5 : Design and development

During Phase 5, the activities carried out cover the process of source selection, notification of intent to call for bids, request for bidders' views, preparation of the Invitation for Bid (IFB), and the review of the IFB by the NACISA Specification Review Board. The final approved IFB contains the full system specification together with the support requirements such as Logistics, Configuration Management and Documentation, Quality Assurance, Manpower and Training (see Fig. 6). The finalized IFB is sent to those Bidders who have been nominated by their national delegations as potential contractors for the project. Further activities in this Phase deal with the receipt of bids from contractors, bid evaluation, pre-contract negociations, and eventual contract award.

3.4 Phase 6 : Production

Activities in this phase begin with the operational contract which inter-alia, requires the following major activities to be carried out (see Fig. 7):

- Project Implementation Plan (PIP) which stipulates how the contractor is going to execute his work, what deliverables are required and when.
- Project Management Meetings during which the contractor's performance vis-à-vis the PIP is discussed, and any proposed changes either to the PIP or the contract are identified.
- Project Level Configuration Management Board (PLCMB), which is chaired by the NACISA Project Manager and, at which other representative elements are involved and is the vehicle through which changes e.g. deviations, waivers, engineering change proposals, to the contract are monitored and controlled.

Further major activities performed during this phase include:

- Delivery, installation and site acceptance testing.

  During this period, factory acceptance tests are carried out, site readiness is established, equipment is shipped, equipment installation and integration is performed, and site acceptance testing is carried out.

- Site activation, cutover and transition to Operating Authority.

  During this period, integration of the delivered system with other site facilities takes place. The system is brought into operational use in accordance with cutover and transition plans previously drawn up and coordinated with local and network operating authorities.

3.4.1 Provision of documentation deliverables

During the production phase, the contractor is required to generate the specific documentation packages called for in the contract. Either existing documentation packages are adapted to meet contract requirements, or new documentation packages are developed. The procedures involved in the generation, review and acceptance of these packages are shown in Fig. 8.

The termination of this Phase is marked by the formal acceptance of the delivered system by the operating authority, and the closing out of the NACISA Host Nationship obligations in accordance with Joint Formal Acceptance Inspection protocols (JFAI).

The types of documentation packages that are required to support an operational and fielded CIS system have already been mentioned (see Fig. 5). However no mention has yet been made as to who are the end users of this documentation. These users fall into two distinct categories i.e. primary and secondary, and these are shown in Figs. 9 and 10. In the case of the primary users, an indication is also given concerning the types of documentation provided.

4. MAINTENANCE OF CONFIGURATION MANAGEMENT DOCUMENTATION

4.1 Phase 7 : In-service and post implementation support

During this phase, equipment has been deployed and the system is fully operational. Normally there is a warranty period required after the contractor has completed his operations, and any deficiencies or latent defects that arise in this period are the contractor's responsibility. This is also the case with documentation, and the corrective action required is shown in Fig. 8.

Similarly in the post warranty period, corrective action will almost certainly be required. The master set of documentation deliverables is held by the Configuration Management Branch/System Support Group at NACISA. When changes are required, proposals are made in accordance with the following NICSOIs :

NICSOI A-11-02 Configuration Control of NICS hardware.
NICSOI A-11-03 Configuration Control of NICS software.

The procedures with respect to modification proposals to operational systems call for coordination by the operational site/unit through the appropriate Local Control Organisation (LCO) or Regional Operations Centre (ROC) to the NICS Central Operating Authority (NICS COA). After approval by NICS COA, the modification proposal is passed to the NICS

Configuration Management Board (NICS CMB), for ratification and subsequent implementation by NACISA.

5. STORAGE MEDIA CURRENTLY UTILISED

For the purpose of this paper, configuration management documentation has been divided into two major categories :

5.1 Handbooks

Handbooks are required to support site/operational unit use and Depot use (Communications Logistics Depots). Consequently, the end user requirement is for hard copy, and it is anticipated that this requirement will continue to exist for some time.

5.2 Drawings

Installation (as-built) drawings are required for site/operational unit use, and hard copy is required. However in the case of the CLDs (Depots), the engineering drawing packages are voluminous, for example, the SATCOM III engineering drawing package amounts to more than 50.000 drawings. In this case, 35mm aperture cards are used as the primary storage media. Where possible, these are obtained directly from the contractor as a deliverable, but when he does not have the facility to convert his drawings from hard copies to aperture cards, this action is carried out by NACISA, and the necessary cards are duplicated and dispatched to users.

6. FUTURE AUTOMATION PLANS

6.1 Handbooks

As specified in 5.1 above, the end user requirement is for hard copy only, and one hard copy is also maintained for reference purposes in NACISA. However, when modifications/updates to the handbooks are required this is a time consuming inefficient process.

Clearly, the long term solution to this problem is to convert to a magnetic storage media. In all current NACISA contracts, the requirement is being inserted for magnetic media deliverables in the form of floppy disks formatted using WordPerfect as the standard word processing package.

In the meantime, use has already been made of a commercial scanning bureau to convert some of the existing hard-copy data into magnetic media. At this moment only the text is being scanned, since to digitise the graphics would require an inordinate amount of storage space. However, this is an expensive solution to the problem, and the best option is to acquire an in-house capability encompassing an A4/A3 document scanner, powerful Intelligent Character Recognition (ICR) package and a suitable workstation equipped with a large capacity (+/- 200MB) hard disk together with printing/plotting facilities. The specification for this equipment has already been prepared and the necessary funding to support this activity is now being sought.

6.2 Drawings

As specified in para 3.2, and depicted in Fig. 5, two types of drawing packages may be procured. With respect to the engineering drawing packages, these are extremely voluminous and the drawing data remains almost totally unchanged during its life cycle since it relates to logic diagrams schematic drawings, printed wiring assemblies, parts lists, etc. dealing with repair/maintenance activities and not manufacturing. Consequently the cheapest and easiest mass storage media is utilised and this is still microfilm in the form of 35mm aperture cards.

However, in the case of installation drawings, the size of the drawing package is smaller, and some of the data is dynamic. Using the previously cited case concerning the SATCOM III project, a typical site drawing package contains some 150-200 drawings of which some 10-15 drawings such as inter-rack cabling, equipment layout, floor plans, power, distribution, are subject to change during the equipment life cycle. Whilst the site/operational unit receives hard copies of the drawings this data is also held by NACISA in aperture card format. The procedures describing how change proposals are handled, are briefly mentioned in para 4.1 of this paper. A typical example of an installation drawing is shown in Figs. 12, 13 and 14. When changes occur to this kind of drawing it is inefficient to have to redraw the drawing. Consequently a computer aided design (CAD) package is used. NACISA is currently using AUTOCAD as its standard CAD tool. First of all a hard copy is generated from the aperture card. This drawing is then passed through a large document scanner capable of handling drawing sizes up to A1. The drawing is then raster scanned which takes about 2-3 minutes for a typical A2 sized drawing, then the scanned image is "massaged" to ensure adequate drawing quality, Using the AUTOCAD Overlay ESP drawing package, the required changes are superimposed onto the original drawing, and a new drawing revision is produced. Hard copies are provided to the end user, and the "master" drawing is stored on aperture card. At the present moment, scanned drawings are being held on floppy disks but this is not a long term solution, since storing an average A2 sized drawing may require 2 megabytes of space (at 400 DPI), and consequently only 1 drawing can be stored per disk. Clearly, a long term solution cheap mass storage of drawing data is required, and a number of possible options are being investigated at this moment.

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7. NICSOI A-11-02. Configuration Control of NKS Hardware 3rd revise. 1989
8. NICSOI A-11-03. Configuration Control of NKS Hardware 1st revise. 1989

8. LIST OF ILLUSTRATIONS

CONFIGURATION MANAGEMENT DOCUMENTATION

CONFIGURATION MANAGEMENT DOCUMENTATION COMPRISES ALL SPECIFICATIONS, HANDBOOKS, DRAWINGS AND RECORDS THAT RELATE TO THE DESIGN, PERFORMANCE, INSTALLATION, OPERATION, AND MAINTENANCE OF CIS FACILITIES.

Figure 1

PAPS PHASES 1-4

PHASE 1

MISSION NEED EVALUATION IN WHICH AN OPERATIONAL DEFICIENCY IS IDENTIFIED.

PHASE 2

PREFEASIBILITY IN WHICH TECHNICAL CONCEPTS TO CORRECT THE OPERATIONAL DEFICIENCY ARE IDENTIFIED.

PHASE 3

FEASIBILITY IN WHICH IN-DEPTH EVALUATIONS OF THE MOST PROMISING TECHNICAL CONCEPTS TO CORRECT THE OPERATIONAL DEFICIENCY ARE CONDUCTED.

PHASE 4

PROJECT DEFINITION IN WHICH AN AGREED SET OF SPECIFICATIONS AND A PROPOSED PROGRAM ARE DEVELOPED.

Figure 2

PAPS PHASES 5-8

PHASE 5

DESIGN AND DEVELOPMENT IN WHICH VALIDATION OF THE SELECTED TECHNICAL APPROACH IS CARRIED OUT ENSURING THAT PRODUCTION CAN BEGIN.

PHASE 6

PRODUCTION IN WHICH EQUIPMENT IS MANUFACTURED AND DEPLOYED/INSTALLED.

PHASE 7

IN-SERVICE IN WHICH EQUIPMENT HAS BEEN DEPLOYED AND IS IN FULL OPERATION.

PHASE 8

DISPOSAL IN WHICH EQUIPMENT IS REMOVED FROM OPERATION AND DISCARDED.

Figure 3

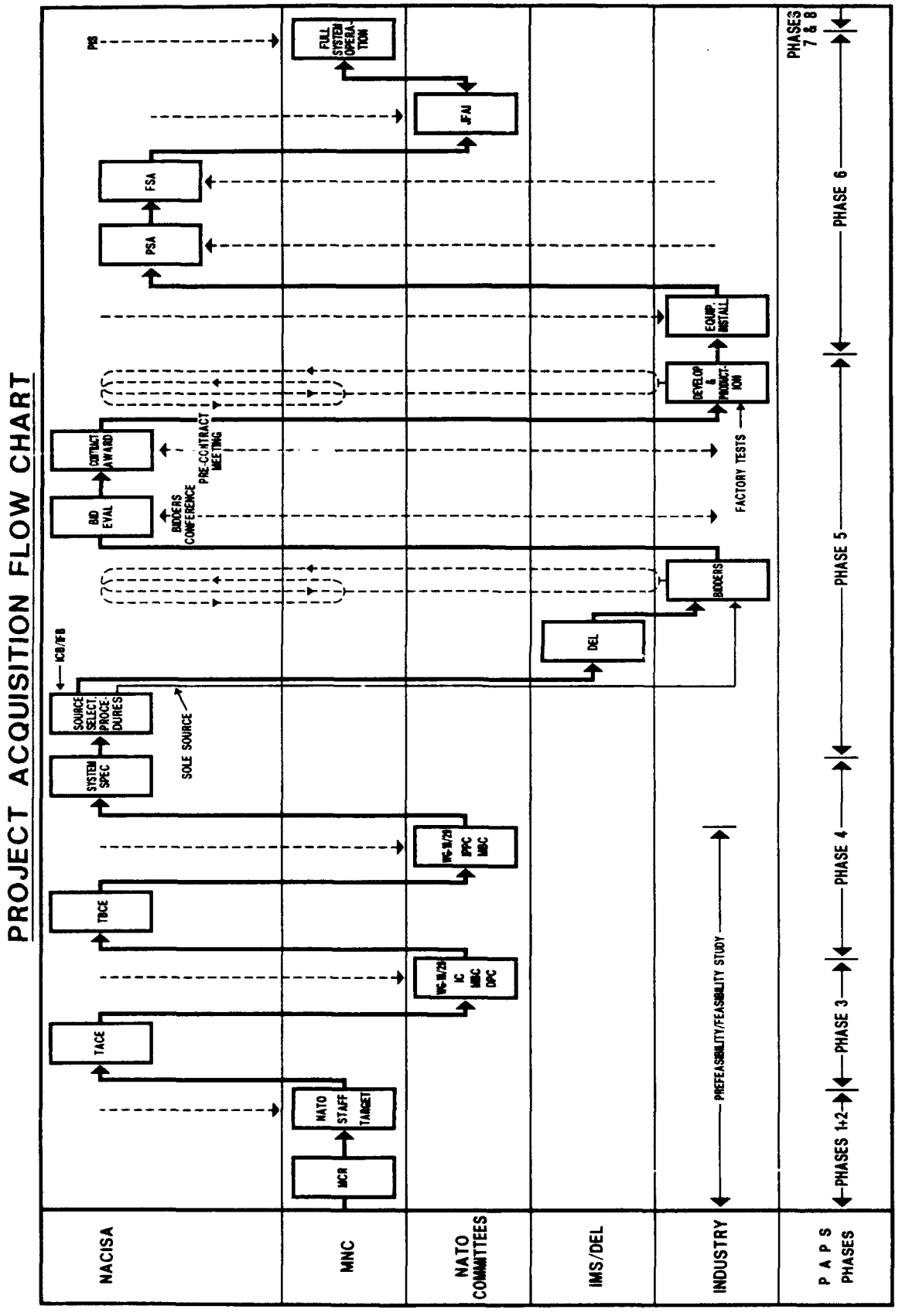
PROJECT ACQUISITION FLOW CHART
NACISA
MNC
NATO COMMITTEES
IMS/DEL
INDUSTRY
P A P S PHASES
PHASES 7 & 8
PHASE 6
PHASE 5
PHASE 4
PHASE 3
PHASES 1+2
PREFEASIBILITY/FEASIBILITY STUDY
FACTORY TESTS
PIS
FULL SYSTEM OPERATION
JFAU
FSA
PSA
EQUIP INSTALL
DEVELOP & PRODUCTION
CONTRACT AWARD
BID EVAL
PRE-CONTRACT MEETING
BIDDERS CONFERENCE
ICB/FB
SOURCE SELECT. PROCEDURES
SOLE SOURCE
SYSTEM SPEC
TACE
TRCE
NATO STAFF TARGET
MCR
DEL
BIDDERS

Figure 4

DOCUMENTATION PACKAGES

PARTIAL PACKAGE

SITE OPERATION AND MAINTENANCE HANDBOOKS

INSTALLATION (AS-BUILT) DRAWINGS

FULL PACKAGE

DEPOT MAINTENANCE HANDBOOKS

ENGINEERING DRAWING PACKAGES

Figure 5

INVITATION FOR BID (IFB)

SYSTEM SPECIFICATION

SUPPORT REQUIREMENTS

- LOGISTICS
- CONFIGURATION MANAGEMENT & DOCUMENTATION
- QUALITY ASSURANCE
- MANPOWER & TRAINING

Figure 6

CONTRACT OPERATIONAL

PROJECT LEVEL CONFIGURATION MANAGEMENT BOARD (PLCMB)

PROJECT IMPLEMENTATION PLAN (PIP)

PROJECT MANAGEMENT MEETINGS (PMM)

Figure 7

DOCUMENTATION PRODUCTION FLOWCHART

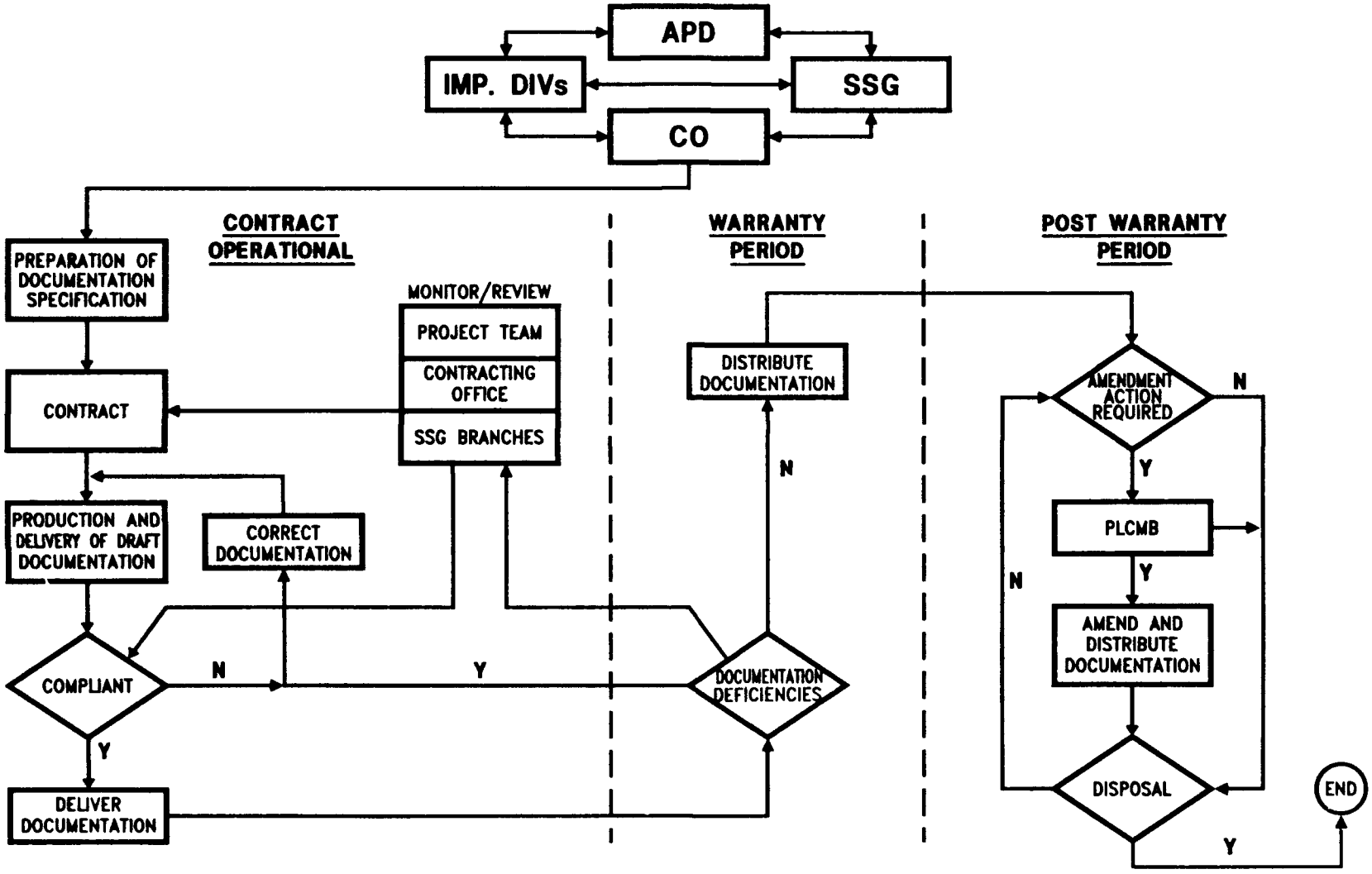

Figure 8

DOCUMENTATION USERS: PRIMARY

SITES/OPERATIONAL UNITS

SITE OPERATION & MAINTENANCE HANDBOOKS

INSTALLATION (AS-BUILT) DRAWINGS

COMMUNICATIONS & LOGISTICS DEPOTS (CLDs)

DEPOT MAINTENANCE HANDBOOKS

ENGINEERING DRAWING PACKAGES

Figure 9

DOCUMENTATION USERS: SECONDARY

NICS COA (INCLUDES SMDC)

NAMSA

ROCs

LCOs

NCIS LATINA

Figure 10

MODIFICATION PROCEDURES

NICSOI A-11-02 (3rd REVISE):

CONFIGURATION CONTROL OF NICS HARDWARE

NICSOI A-11-03 (1st REVISE):

CONFIGURATION CONTROL OF NICS SOFTWARE

Figure 11

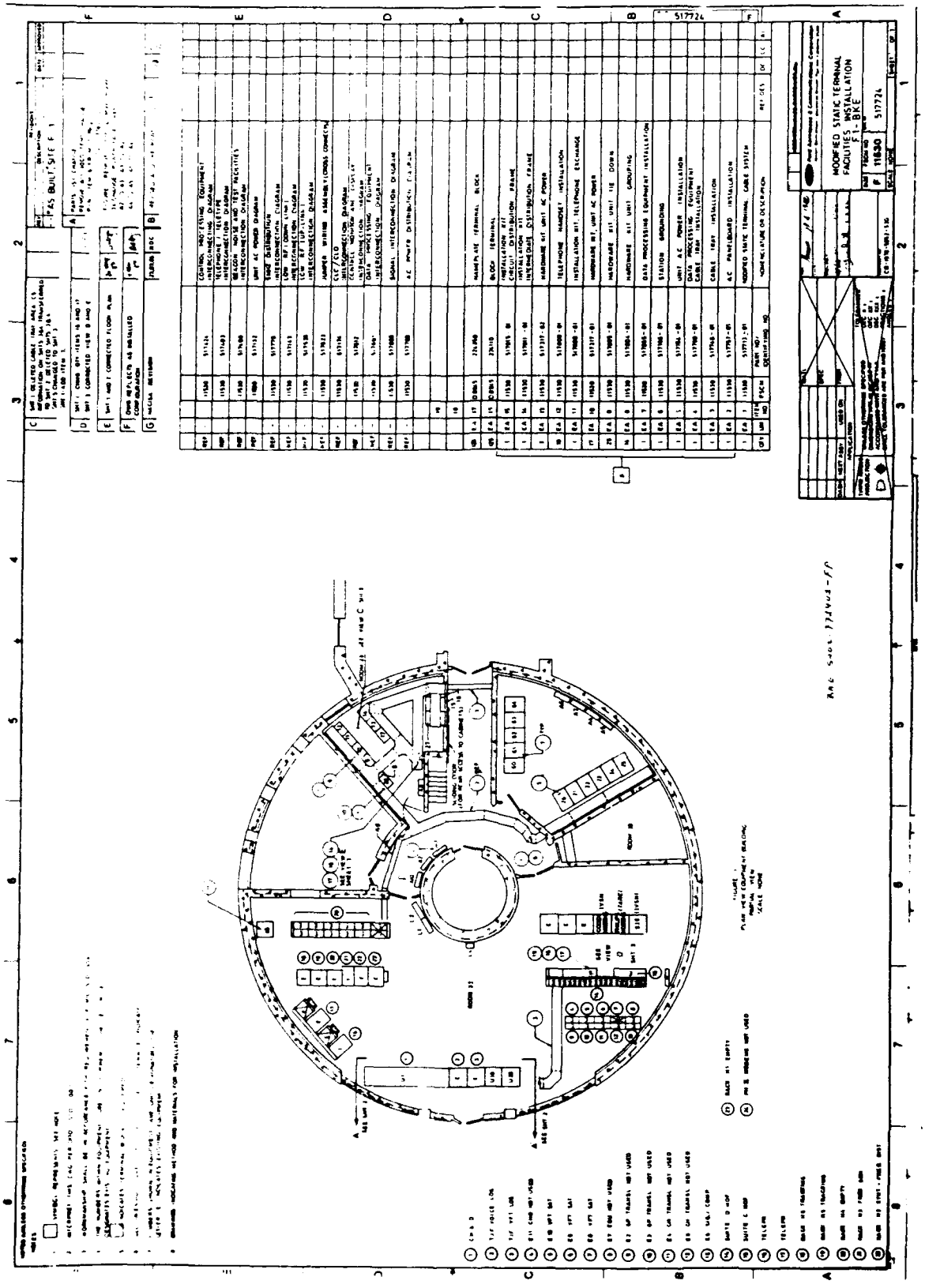

Figure 12

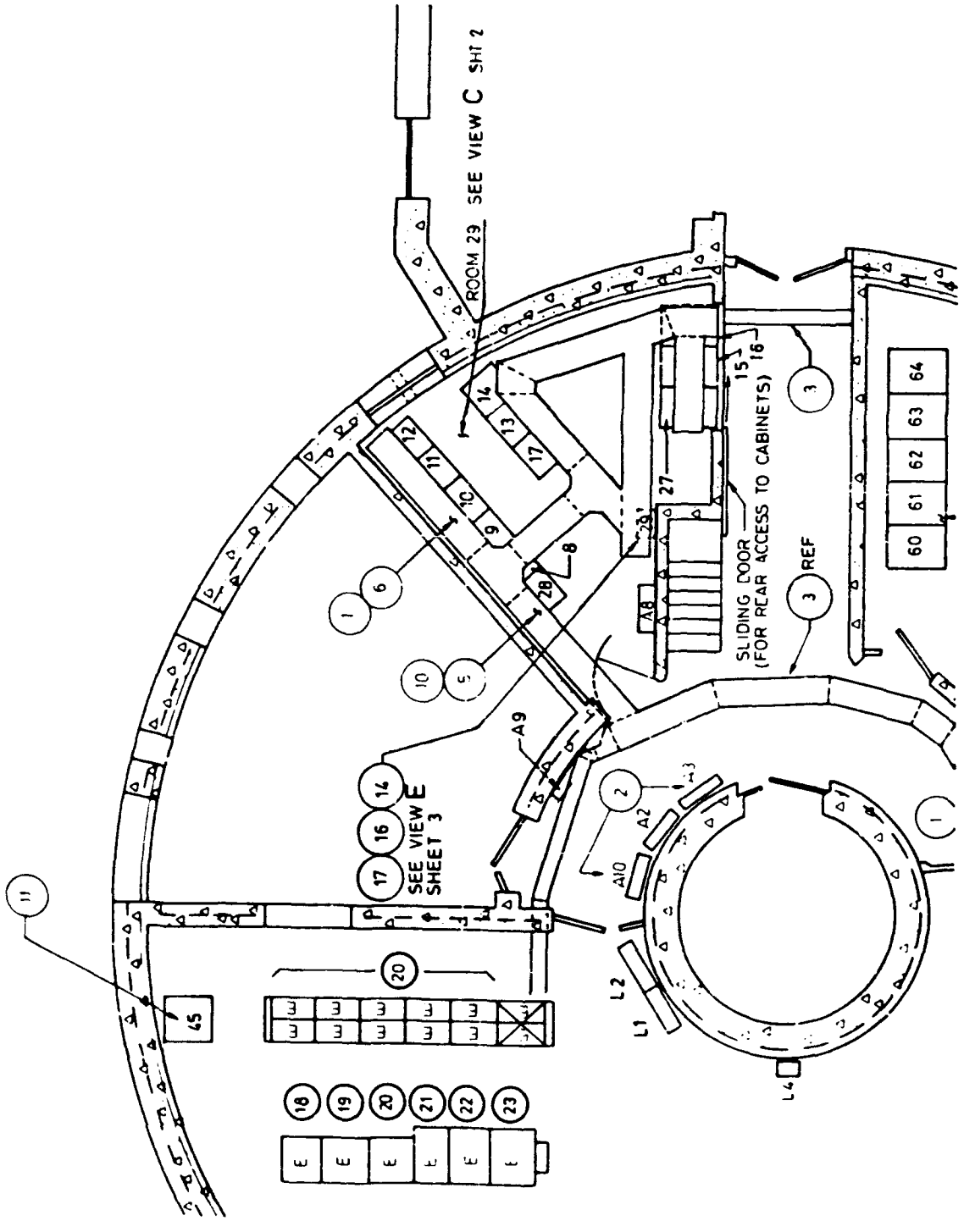
SEE VIEW C SHT 2
ROOM 29
SLIDING DOOR
(FOR REAR ACCESS TO CABINETS)
REF
SEE VIEW E
SHEET 3
A1
A2
A3
A8
A9
A10
L1
L2
L4

Figure 13

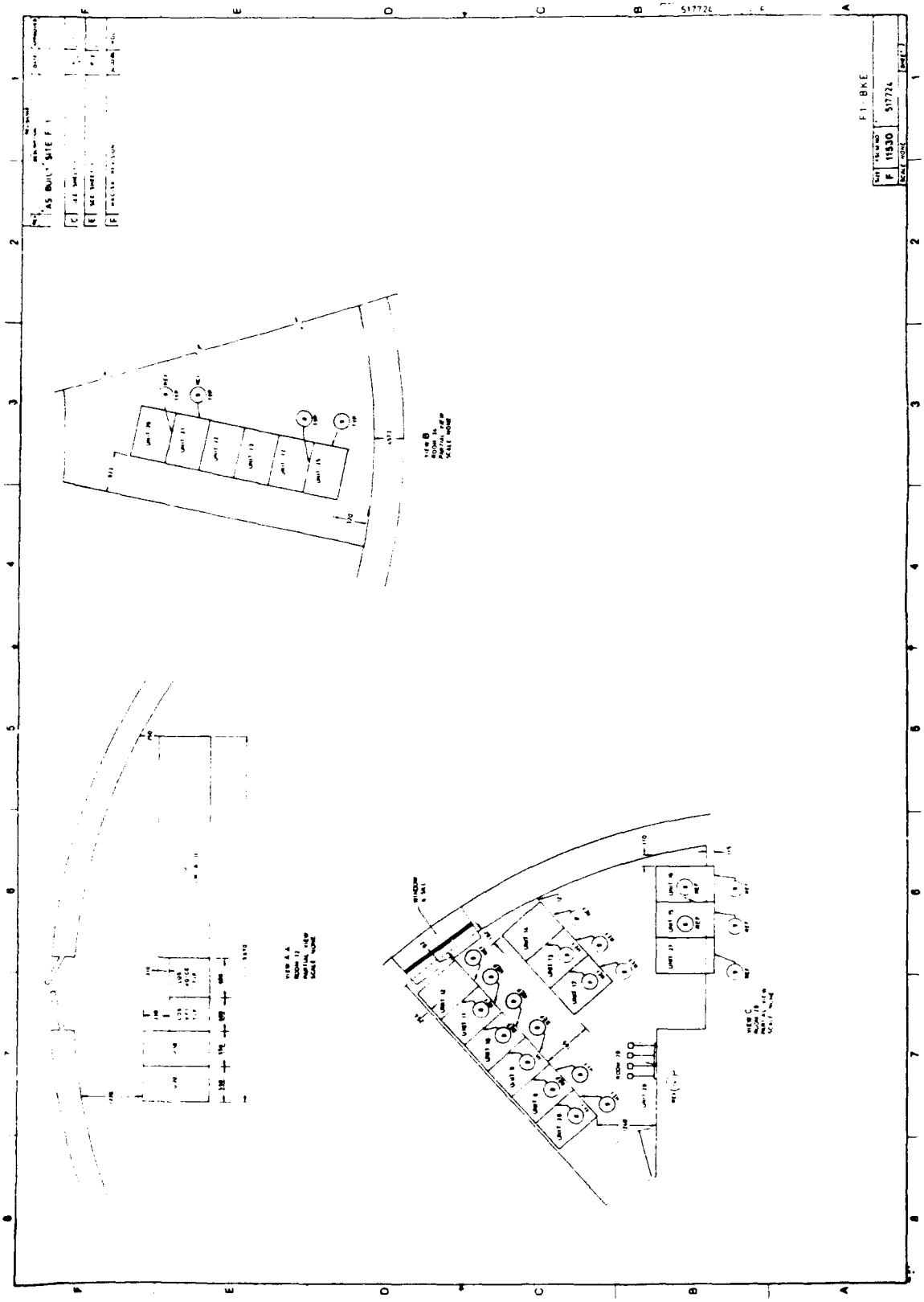

Figure 14

DOCUMENT PROCESSING

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1. SUMMARY

Information systems operating a referral-type database, need to produce references for their documents in order to successfully retrieve the information. The same references serve as an initial user information, thereby enabling the users to decide upon the information value of the document contents for their own specific requirements.

The paper describes the various steps in producing such references, the process we call document processing: Descriptive cataloguing deals with the various bibliographic data of documents. Content analysis, subdivided into classifying, indexing, and abstracting, is discussed in some detail. The thesaurus as the main instrument of an indexer, its function, and its structure are described. Finally, the data of the reference are entered into the data base for information retrieval, whilst the document is stored in the document collection.

2. TECHNOLOGY VERSUS INTELLECTUAL WORK

Talking about modern technical information systems, most conversations tend to concentrate on purely technical aspects of information work. The discussions cover questions of computer technology, storage capacities, data transfer rates, networking techniques, user interfaces, gateways, etc, etc. So the interested layman must get the impression that modern technology is all you need to run an effective information service. And even amongst insiders from the vast information community, you are more likely to meet the technology-oriented enthusiast, rather than the plain information specialist, who believes in the human as the most important part within the wheelwork of an information system.

Technology certainly plays an important role in modern information systems, and it always has had its significance for information work right from the beginning of the profession. Remembering index cards, punch card machines, and teletype terminals, which were widely in use not too many years ago, and thinking of modern equipment, such as high capacity mainframes, or optical disc storage devices, demonstrates the immense progress in technology within an extremely short period of time. And there is no foreseeable end to the rapid developments in all fields of data processing technologies and their applications in information work. These developments are to be acknowledged, and they are essential. The enormous increase of information produced by researchers, scientists, and engineers calls for an efficient and reliable information management. And this information must be made available at distant places, on short notice, as complete as possible, and as precise as required.

But information work cannot be reduced to computers and other high technology features. It is still the human being, who is at present indispensable for the effectivre operation of an information service. Especially when designing a new information system, the preparatory work must be carried out by the human with meticulous accuracy, and this spade work will show crucial for the result and success of the system. This lecture series is aimed to highlight some of the basics of information work. So, this paper will discuss some of these basics, which are applicable to all types of information services, whether they operate in a highly automated environment, or whether the are run in a more modest way.

As I want to concentrate on the basics, as impelled by the lecture series' title, this paper will stress the more practical aspects of the documentation process. Of course, my personal background influences some of my statements, in other words, my arguments are influenced by the practices and methods, used within the organization I work for, i.e. the Federal Armed Forces Documentation and

Technical Information Center (DOKFIZBw). So, the theoretical background for the various steps in this process will go short. There are more than enough publications on any of the discussed subjects readily available, and each single item would justify a lecture series on its own.

3. THE DOCUMENTATION PROCESS

Advances in science, progress in research, increases in technical know-how, new ideas, inventions, and discoveries are normally recognized in publications. Publications contain knowledge, which, again, is derived from a great variety and diversity of well structured information. To accumulate all these numerous publications in an information system in order to have them readily available is desirable, for practical reasons, however, impossible. Even if concentrating on very narrow subject fields for a single system, which, due to the more and more interdisciplinary understandig of scientific work, would cause only new problems, the incredible amount of published material prevents such procedures for two reasons.

Any publication contains a great number of isolated data, which, if the single information can be traced, and combined with other informations, will become the basis for an increase in knowledge. But to trace a specific information within a publication, and to extract it on demand, calls for one of two things:

> The document collection must be available in machine-readable form, such as on hard discs, CD-ROM, or any other suitable storage media, allowing rapid random access for an effective computer search process.
>
> The information can be retrieved indirectly by use of a practicable mechanism, which again allows the application of computer technology for the retrieval process.

Although the availability of documents in machine-readable form is steadily increasing, the build-up of a retrievable fulltext data base demands large quantities of expensive storage devices, as well as highly efficient computer hardware, and powerful retrieval software. And, mind you, as most certainly not all of the relevant documents will be provided in machine-readable form, there would be the problem of converting printed texts using optical character recognition techniques, or even retyping. For practical use in day-to-day information work, fulltext data bases are at present a valuable addition to any information system. As technology advances, and as more and more documents will be provided to the systems in machine-readable form, their importance will increase. To come back to the basics of information work, I will describe the methods most widely used within present-day information services.

3.1 References

The principles date back into the times, when all information work was done using index cards, punch tapes, etc, without the help of computer equipment. Nevertheless, it was possible to transfer these procedures with a few minor changes and step by step adaptations into the modern environments of highly computerized information systems. The idea was to create for each document a reference, much shorter than the original document, squeezing as much information into this reference as possible, and making it easily retrievable through standardized search terms. The information retrieval process, then, was directed towards the reference, not the document itself. Of course, there must be a link between the reference and the document. The preparation of such references, as substitutes for the documents, is the actual purpose of the documentation process.

Whether such references are printed on index cards, which are then stored in an optional order in a cardex, or whether they are held as data records in a data base, is eventually of minor concern. No need to emphasize that a data base storage is much more handy, because of the multi-dimensional acces to the single record. A cardex system always allows one key entry only. And storing several cardex cards for the same reference under different entries is only possible up to a very limited extent. A data base of references, however, grants multidimensional access, allowing for any single information in the reference to be retrieved. Such referral-type data bases are operated to a great extent in modern information systems, and this paper will mainly discuss questions and problems related to this type of information service.

A reference, on one hand, must correspond to the document it refers to as much as possible, as far as the contents of the document, its

information, is concerned. On the other hand, the contents of documents of many different types and formats, such as technical reports, compilations, theses, conference papers, journal articles ect must be converted into a formalized and standardized short form. Of course, it is impossible to include every single information, which is contained in say a 120 page technical report, in a reference of the size of approximately one page, allowing for practical purposes the maximum of 2000 to 3000 characters. However, the daily routine work within many information centers has proven that it is absolutely possible to achieve this task quite satisfactory.

This documentation process is at present still a domain of the human being. Knowledge, skill, and experience of the information specialist, the indexer, as he is called with reference to one of his duties, are decisive for the result of a search for the information, which will be carried out at an indefinite time later on, in most cases by someone else, who most likely has never seen the respective document he is trying to retrieve. The indexer must realize that his work, his ability to identify the essential information contained in the document, and to transform it correctly into the reference, is crucial for the result of the retrieval process. Only information, which has been included in the reference, can be retrieved reliably. So, actually the responsibility for an effective information retrieval, carried out either by an end user or an intermediary, rests with the indexer. He has to ensure that as much information as ever possible is transferred from the document into the reference, and that the inevitable information losses, which will have to occur during this transition process, are tolerable and kept to a minimum (Figure 1).

The whole process, which we call document processing, can be divided into five main working steps:

- document analysis
- descriptive cataloguing
- content analysis
- data entry
- document collection.

This process is carried out in a certain working sequence, not necessarily by the same personnel, because the different working steps require different qualification levels and skills. By example of the sequence of operations in my organization, I will demonstrate one way of producing a referral type data base. But before doing this, one more consideration needs to be done.

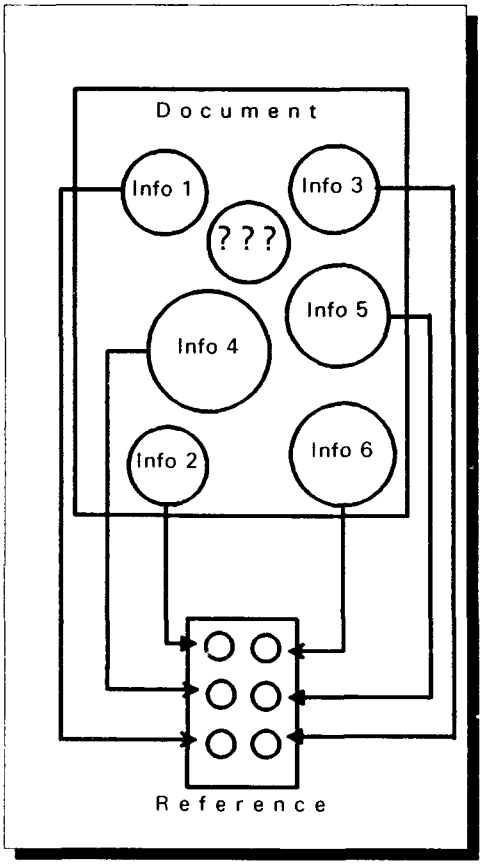

Figure 1

3.2 Structure

The structure of the reference, which in fact determines the structure of the data record in the data base, needs to be considered carefully in advance. A detailed structure permits to address individual data elements directly, thus adding more comfort to the retrieval process. It also shows very functional, if printouts of the references are required in continually new formats for a variety of users and purposes. However, it influences considerably the work of the personnel doing the descriptive cataloguing, the indexing, and even the data entry. A simple structure, consisting only of a few data fields, requires less time for producing the reference. Retrieval, however, will be less comfortable, and the layout of references in a printed version will become

less flexible. Considering the fact that each reference is produced only once, retrieval, on the other hand, happens repeatedly and is often carried out by people with only a limited experience, it seems to be reasonable to apply high efforts into the input, and facilitate the output of the system. We will reconsider these questions later on when discussing data elements for the descriptive cataloguing of documents.

The structure of the reference is also largely affected by the type of documents which the system wants to include in its holdings. Again an example from DOKFIZBw: Starting out in 1963, a data record sheet with a very simple structure was sufficient to hold the data for the journal articles, which accounted for more than 95 percent of the DOKFIZBw documents at that time (Annex A). However, within a few years only, it was necessary to include a great variety of document types, such as technical reports, test reports, conference proceedings, standards, Memoranda of Understanding, and even Bundeswehr training films, etc. Because all these document types contain different and distinct data elements, and only one data structure was to be chosen for practical reasons, a complete new data record sheet had to be developed (Annex B). It was not possible to merge the two structures into one, because data elements in the "old" structure could not be properly addressed. Therefore, DOKFIZBw still works with two data bases with different structures, which certainly is at least undesirable.

Whether the data of the reference are kept on a paper form, or whether they are entered immediately online into the data base, is just a practical working consideration. Filling out a paper form seems to be somewhat absurd, because it practically has to be retyped by the data entry personnel. In DOKFIZBw, however, this working process has shown to be quite effective over the years, especially, because nearly two thirds of the input is produced by people working outside of the system. This point will be taken up again when considering the data entry step.

3.3 Purpose

Until now, the only argument for producing references to documents was to guarantee an effective and comfortable information retrieval. This, of course, stays true. But, in addition hereto, references have also the function to inform the user of the contents of the document, thus allowing him to judge the information value of the document for his own individual purpose. If the end user does his own data base retrieval, he sees of course only the references on his monitor. And even if he uses an intermediary to do the information retrieval, he normally gets only printouts of the references as well. So he has to evaluate these references in consideration of his personal information requirements.

Information services produce abstracting journals, compilations, bibliographies, etc for various purposes and users. Naturally, they use the references, modifying them as appropriate, to best suit the specific situation. Again, the reader should be able to recognize from the references those documents, which are of value for his own personal information requirements.

So references must serve for two distinct applications: They must allow to retrieve the respective information on request reliably, comfortably, and accurately. And they must inform the end user in sufficient detail about the contents of the respective documents, allowing him to judge the value of the documents for his own, individual purposes.

4. DOCUMENT ANALYSIS

Although it might be well worth discussing the working sequence of single elements in the documentation process, undoubtedly, the document analysis will have to be the first step. Careful analysis of the document requires an understanding of the document in its entirety, accurate assessment of the contents, unbiassed evaluation of possible innovations, and discerning looks for details. This analysis will have to be done considering carefully the subject fields of the information service, its user structure, and its overall information policy. If a document does not fall within the spectrum of the subject fields of the service, it will most likely be eliminated from the documentation process, an easy decision for the analyst. If a document has passed this first filter, the next decisions are based on a thorough understanding of the specific user community, and on its information needs. Profound knowledge of the current stock of documents administered by the system will be very helpful for reaching the right decision - to include the document, or to reject it. The right answer to this yes-or-no-question exercises an

immense influence on the competent composition of the document collection, and the corresponding data base. Documents, which are rejected as result of a wrong decision by the analyst, will not be available through the system, and therefore cannot be notified to the user. The wrong decision has created an information gap. On the other hand, including documents which are not required by any system user, form merely ballast, hamper systems operation, and cost money.

Document analysis will follow certain guidelines. It will have to answer questions such as

- What is the topic of the document?
- Which fields of interest are addressed?
- What is the main concern of the author?
- Which facts are discussed?
- What processes are described?
- What are the assumptions of the author
- What are his arguments?
- How does he prove his statements?
- What new findings does he communicate?
- Which results does he achieve?
- What are his conclusions?

Document analysis will also consider some more formal aspects of the document. The name of the author (his reputation and authority as a specialist), the source of the publication (a thesis, a pubication in a well recognized specialized journal), the publication date, the number of citations, enclosed graphics or statistics, and the method of representing the contents should be taken into consideration. One extra thought about documents in unusual languages, compared with the normal system language: The analyst might purely accidental be able to analyse a document in a foreign language which is not normally spoken in his user community. If he decides to include this document he should be well aware of the fact that the majority of his users will not be able to work with this document. If system management has not given sound advice on how to proceed in such cases, he should decide with caution.

All the aforementioned details call urgently for the real specialist, the scientist, or engineer, at least the knowledgeable insider, who has expert knowledge, and who understands in detail the train of thought of the author Unfortunately, such an expert will seldom be available for this work. The working practice in any information center is quite another one: The indexer, who does this document analysis, has to cover a broad spectrum of adjoining subject fields. He will most likely be an expert in one or two of these fields, and he will have appropriate knowledge of the other areas. But to make good for this shortage, he has long-standing experience in his job, knows the user needs, and the holdings of the system. And this personal experience and knowledge, combined with common sense, analytical intelligence, and an instinct for the essentials are really invaluable.

Document analysis does not mean reading a document. A reading analyst simply uses too much of his valuable (and costly) time for this first step of the documentation process. As stated before, for analysing the contents of a document, it is normally sufficient to understand the overall problem of the document, the arguments of the author, his chains of reasoning, the focal points of his solutions, and his new findings. It seems obvious that the quality of the document analysis grows with the time, which the indexer spends on the document analysis. But that holds only true to a certain extent. Certainly, the quality rises with an increase of time, but this process occurs not in a linear proportion. It is essential, therefore, to recognize the break-off point (Figure 2), because spending more time on the document analysis does not add much to its quality, but only wastes time, and thereby money.

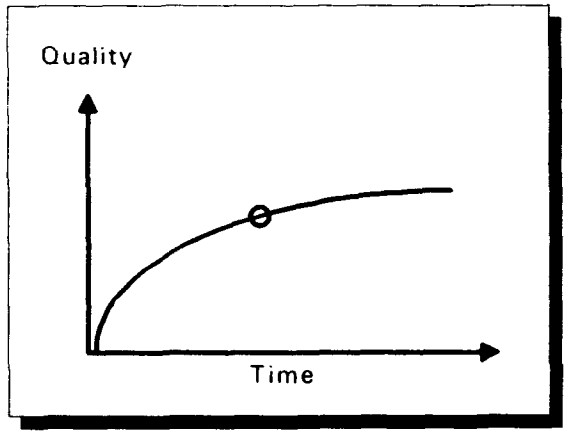

Figure 2

The demand to specify an appropriate time for document analysis should not be raised, because there is no answer to it. However, there are some well-accepted fundamentals which might help: It takes less time to analyse a well structured document with a clear train of thoughts, than to fight his way through an

undergrowth of confuse ideas. The lenght of a document certainly influences the necessary time to some extent. Documents written in a foreign language require more time than those written in the mother tongue. Documents within the main subject fields of an indexer will certainly require less time than those from adjoining fields. Not to mention the experience of the indexer, and his personal style of work. It must be recognized that the process of document analysis, and, actually, the whole process of content analysis, is intellectual work, which hardly can be standardized, and pressed into a time frame.

5. DESCRIPTIVE CATALOGUING

Due to the fact that two excellent papers have been presented at AGARD TIP Specialists' Meetings (1, 2), covering most aspects of descriptive cataloguing of documents in great detail, I want to restrain this part of my paper to some truisms, just to set the background for some practical considerations. Descriptive cataloguing (or bibliographic description) of documents deals with the more formal, bibliographic data of documents, such as name of the author, originating agency, date of publication, etc, just to name a few of them. These bibliographic elements clearly identify a document, they are therefore required for the procurement of documents, and they are mandatory for citations.

Missing bibliographic data may cause considerable problems, because it might be impossible to provide a desired document due to the fact that it cannot be identified, although it is actually available within the system. Therefore it must be ensured that all relevant bibliographic data are extracted and recorded from each document. The main question hereby will certainly be: Which actually are the "relevant bibliographic data" of a document?

Obviously recording too few data will lead to the problem mentioned above: Documents might not be identified, although available within the system. On the other hand, recording all bibliographic data of each document, might be overdoing this task. If a certain detail, say the organization of the author, is only needed once every two years in retrieval, it seems a waste of efforts to record the organizations of all authors in all the references. The necessity for such data in the reference, that is their actual use and value, must be carefully weighted against the time needed to record all of them. Certainly, different types of documents require different bibliographic data. Whilst a journal article might be sufficiently described by its author, title, name of the journal and a few more details of the publication, a technical report published by an organization within a conference proceedings will certainly require more details for its bibliographic description.

Which details to record will largely depend upon the overall information policy of the system. But one rule must be observed: To facilitate the exchange of information between systems, and to coordinate information work, the existing standards for descriptive cataloguing must be observed. Out of the suggested data elements for bibliographic references, a selection according to the requirements of the specific system may be made, the selected data elements, however, have to comply with the existing standards. The CENDI Guidelines for Descriptive Cataloguing (3) have been used for bibliographic standardization of reports by the four major federal information processing agencies within the United States for years with good results.

5.1 Bibliographic Data in DOKFIZBw

DOKFIZBw processes a great variety of document types for a large and differentiated user community. Therefore, a multitude and multiplicity of bibliographic data, at least from certain document types, has to be recorded in the references. Furthermore, it has shown to be very practicable, if some of the basic bibliographic elements are again subdivided, and can be retrieved as such. Let me give you an example:

One of the basic bibliographic data to be recorded in certainly every information service is the author of a document. In DOKFIZBw, using one of the usual code systems which allocate specific numbers to certain data elements for identification, a 210, followed by a name, and a first name (210 Braun, Helmut) would indicate: The entry behind the 210 is the name, followed by the first name of a person, and this person is responsible for the creation of the document.

For DOKFIZBw purposes, however, it showed practicable to make a further differentiation between the author as a natural person, who

actually wrote the document, the editor of a document, a speaker, who presented a paper, or a person being interviewed. To indicate the respective function of the named person, DOKFIZBw uses the third digit in the 210 code:

212 Meier, E (M. is the author)
214 Klein, H (K. is the editor)
216 Hinz, A (H. is the speaker)
218 Raspe, K. (R. gave an interview)

In information retrieval, therefore, it is possible to easily find an interview, given by the Minister of Defence, or a speech he made at a certain date. Nevertheless, all entries under the 210 category (i.e. 212 to 218) may, of course, also be retrieved in one step, if so desired.

Similar differences are deliberately made with certain code numbers. Our researchers have well to differentiate between the project number of a research contract allocated by the contracting branch of the Ministry of Defence, the one assigned to the same contract probably by the research institute, and possibly some more numbers being added by subcontractors, etc.

I do not intend to list the numerous bibliographic data elements which are included in our references. They may easyly be identified by the interested reader by looking at the DOKFIZBw data record sheet (Annex B). Probably of more interest is the method used to advise the personnel responsible for the descriptive cataloguing, which data actually to extract from the respective document, and how to record them in the reference.

5.2 Decision Tables

As stated earlier, the decision, which of the many available bibliographic data to record in the reference to a document, depends on the type of document. So the first step in descriptive cataloguing is to determine the document type. This information is recorded by circling the respective fields (Figure 3) right in the heading of the data record sheet:

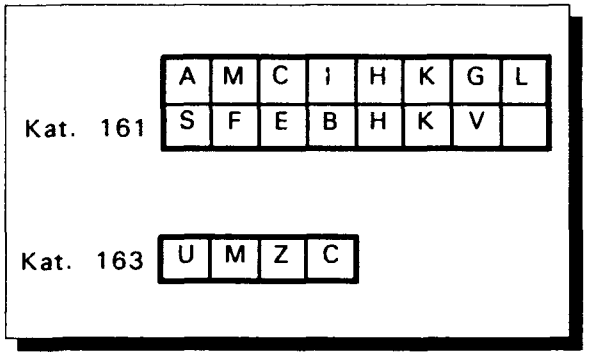

Figure 3

The entry mark in the first field indicates the type of the document, i.e. a technical report, a study, an article, just to name a few. The second field shows the "bibliographic level" of the document, identifying it is an 'independent publication', such as a thesis, or a 'dependent publication', for example a single paper published within a conference proceedings. Out of the combination of these two fields, a network of decision tables has been constructed, containing the directives to the personnel, which data elements to record in the actual case.

DOKFIZBw differentiates clearly bewtween bibliographic data which must be recorded, which should be recorded, and which are not to be recorded. Compulsory data fields must include an entry, whilst discretionary data fields should bear an entry, if the respective data are readily available. In some cases, an entry in one data field excludes one or more entries in other data fields. A document cannot have entries for a personal author, and, at the same time, for a corporate author.

Two examples will clarify this procedure:

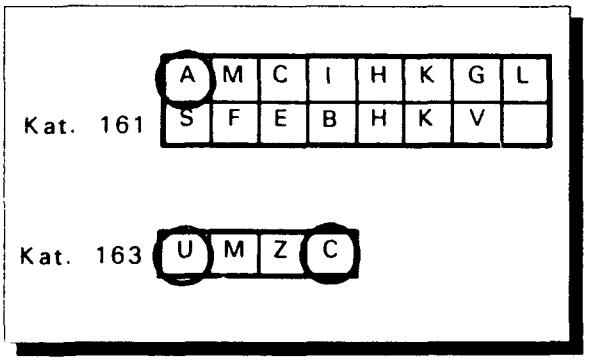

Figure 4

Assigning the code "A" in the first field ("A" for "article"; this may be an article from a periodical, a chapter of a book, a single contribution out of a collected edition) and "U" plus "Z" in the second field ("U" for "unselbständig" = dependent publication, "Z" for

"Zeitschrift" = journal) pinpoint the document as a journal article (Figure 4), and, at the same time, enforces the recording of the following data elements:

Author or corporate author

Title (including the subtitle, if applicable)

Source (details of the journal, in which the article has been published, i.e. title of the journal, land of origin, volume, year, number, publication date, pages from .. to).

Additions (entries, if pictures, statistics, charts are included.

A second example: For a paper, published in a conference proceedings (Figure 5),

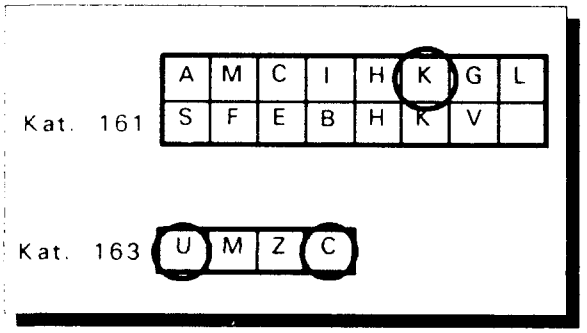

Figure 5

the codes "K" (for "Konferenzbeitrag" = conference paper) and "U" plus "C" ("U" again for dependent publication, "C" for "Konferenzsammelwerk" = conference proceedings) would be marked, causing the following data elements to be recorded:

Author (or corporate author, or speaker)

Title (and subtitle, if applicable)

Source of the document (details of the conference proceedings, in which the respective paper has been published, such as: date of publication, originator or originating agency, conference organizer, title of the conference proceedings, publishers, place and land of publication, total number of pages).

Additions (entries, if pictures, statistics, charts are included.

Details about the conference (date, place and land of the conference, conference topic, agency sponsoring the conference).

As one can easily see, all bibliographical data, which are required to clearly identify a document (and, probably, some more!), are addressed by this system of decision tables, and only these. For the online data entry, the screen mask offers only those fields, which must have an entry, as well as those, which may have an entry. But, at the same time, compulsory entries are enforced.

Along with the decision tables, there is a catalogue with examples, explaining the individual entries, giving all details on the sequence of the entries, their correct construction, and any peculiarities to be observed.

5.3 Coding

Many entries within the bibliographic data fields are done in a coded form. It is, for example, very convenient to enter the land of origin of a document, and its language, in a short one to three letter or digit code form, rather than to enter the full text each time. This is common practice. If the holdings of an information service generate to a noticible extent from journal articles, as is the case with DOKFIZBw, it seems to be reasonable to generate a code for journals, too. Thereby, for one reason, the personnel responsible for the descriptive cataloguing, as well as the data entry personnel, have less typing. The big advantage, however, is to be seen in the consistency of the construction of entries for the titles of periodicals. Of course, the user information always contains the text in clear, the decoding done automatically when retrieving the reference.

The advantages of coding are obvious. The disadvantages: All codes need to be kept up to date. Periodicals, for example, may change their names, they may merge, or consolidate. The code for each periodical must be looked up in a code list or cardex. If by mistake a wrong code is chosen (say the next one in line), the wrong entry will possibly not be detected, because there is no machine check possible. And proof-reading will require to check each single entry again against the code list entries.

Whether to generate codes for corporate authors as well will depend upon several factors: If these producers of documents consist of a reasonable number of always the same institutions, and, if, at the same time,

they produce a reasonable number of documents, such a procedure could be of good use. Managing to code them in a hierarchical scheme, would add much comfort to the retrieval process. However, reorganizations, especially if one includes military organizations as well, cause high efforts in keeping the records up to date. DOKFIZBw has undertaken this project, and still continues with it. Whether the results are worth the efforts, has not yet been proven.

6. CONTENT ANALYSIS

Content analysis is the main element of document processing, the working step, whereby the contents of the document is actually transformed into the reference. Content analysis deals with facts, statements, ideas, thoughts, reflections, considerations, arguments, results, assessments, and conclusions of the author.

This process requires considerable intellectual capabilities. An indexer must possess the ability for analytical reasoning. He must be willing to work systematically, and he must be qualified for critical but unbiassed reviews. His thinking should be creative, he should have a distinct imagination, and he must be able to express his findings precisely, unmistakable, and concise.

Content analysis may be subdivided into three distinct processes: subject classification, indexing, and abstracting, whereby the sequence of this enumeration is of high importance. The indexer, who first writes his abstract, then does the indexing, and finally the classification, will, in many cases, produce references of low quality. The three steps just mentioned follow closely the process of understanding the contents of the document, which has been described earlier in the paper, in answering the three questions:

What is the overall topic of the document?

Which facts, projects, and procedures are discussed by the author?

Which conclusions/results are presented?

6.1 Subject Classification

Talking about classification in the context of content analysis has nothing whatsoever to do with security considerations or security markings. By means of subject classification, the indexer builds classes of documents with equal or similar contents. Subject classification is done for one or more of the following reasons:

- to allow easy sorting of documents by subject matter in announcement bulletins, abstracting journals, and the like,
- to define areas of interest for easy distribution of information by means of pre-defined fields of interest,
- to allow statistical analyses of the date base,
- to group indexing terms in a thesaurus,
- to aid in online searching.

Subject classification is the process of incorporating all documents into a well defined system of document classes, according to their contents. Documents concerning the same subject, or dealing with closely related matters, share the same subject classification. So, for example, all documents on the subject 'antiaircraft ammunition' will probably bear the same classification.

The statement "will probably bear the same classification" in the previous paragraph indicates that the arrangement of documents into document classes (subject classification) may obviously be equivocal, and even ambiguous. This irritation is caused by the fact, that the tools, which are used within different information systems for subject classification, are not standardized, and differ considerably from each other. Range and spectrum of the information fields covered by a specific information service determine the overall number of document classes (subject fields), and also the sensible degree of subdividing these subject fields into groups, or even subgroups. An information service such as the worl-wide recognized National Technical Information Service (NTIS) in the US with its broad interests in practically all fields of science and technology, needs, for purely practical reasons, more subject fields than, lets say, a military information system, such as the Defense Technical Information Center (DTIC) of the US Department of Defense, at least in theory!. DTIC, however, will need to subdivide certain subject fields into more groups, and probably subgroups, to allow a clear

disjunctive delimitation between related subjects, wherever necessary. A classification scheme that is practicable for one information system might well be useless for a second one, just because of its structure, its number of subject fields, and the subdivisions into groups, and possibly subgroups. Two extreme examples: Two subject fields, say one for 'technical documents' and another one for 'non-technical documents' will certainly be unsufficient for any information service. On the other hand, to differentiate between two groups 'Cultural Sociology' and 'Religious Sociology' within the subject field 'Sociology', or between 'Synoptic Meteorology' and 'Applied Meteorology', both examples taken from DOKFIZBw, a military information system, will certainly be the other extreme. Considering the objectives of any subject classification, each information system has to find the sensible solution which best suits its purposes. To illustrate these words it seems best to look at some examples taken from different subject categorization guides.

The aforementioned NTIS lists two different classification schemes for subject classification (4, 5):

The COSATI subject classification scheme, an academically oriented system endorsed by the Committee on Scientific and Technical Information (COSATI), consists of 22 major subject fields (categories), which are further subdivided into 178 groups, or subcategories. This COSATI scheme has been in use since 1964, and was used for grouping documents in the Government Reports Announcements and Index (GRA&I), as an aid in online searching of the NTIS data base, and for the selective dissemination of copies of technical reports using Selected Research in Microfiche (SRIM). COSATI subject categories consist of a two-digit number, ranging from 01 to 22, followed by a capital letter, as required. As an example, the category 15 'Military Sciences':

15 Military Sciences
- A Cost Effectiveness
- B Chemical, Biological, and Radiological Warfare
- C Defense
- D Intelligence
- E Logistics
- F Nuclear Warfare
- G Operations, Strategy, Tactics.

In 1970, NTIS reviewed its procedures, and needs, for subject classification. A new subject classification scheme was developed, called the NTIS subject classification. This scheme, originally used in conjunction with the COSATI system, now provides useful sorting categories, particularly in areas such as environmental sciences, transportation, health, and urban technology. It consists of 40 categories, which are subdivided into some 330 subcategories. This subject classification, again, uses two-digit numbers, from 41 to 99 with some gaps in between, followed by a capital letter, as required. The category Military Sciences, in the NTIS subject classification, looks somewhat different:

74 Military Sciences
- A Antiaircraft Defense Systems
- B Antimissile Defense Systems
- C Antisubmarine Warfare
- D Chemical, Biological, and Radiological Warfare
- E Logistics, Military Facilities, and Supplies
- F Military Intelligence
- G Military Operations, Strategy, and Tactics
- H Nuclear Warfare
- I Passive Defense Systems
- O General.

The differences are quite noticeable. Using two different subject codes next to each other for nearly twenty years, certainly caused a lot of irritation to the online users of the NTIS data base. Both codes have been applied to documents from 1970 until 1987, but obviously not in all cases. The online user could hardly recognize the procedures for their application. At present, only the NTIS subject categories are used for the classification of documents within NTIS. The current NTIS category scheme lists 40 headings with a total of 394 subheadings. This scheme, however, is evolving. It will continually be modified to meet expansions in science and technology. An asterisk in front of a NTIS classification code, by the way, indicates a citation which has a potentially higher interest than other citations. These 'weighted classification codes' are only assigned to roughly 20% of the database accessions.

DTIC uses its own subject categorization scheme (6). It has 25 numerical fields ranging from 01 (Aviation Technology) to 25 (Communications). These fields are subdivided as required into roughly 250 groups, again by two-digit numbers, and subgroups, if necessary. The DTIC subject categorization

scheme is actually an extensive revision of the COSATI subject categorization scheme, best suited for DTIC purposes. The heading 'Military Sciences', again, looks different:

15 Military Sciences
- 01 Military Forces and Organizations
- 02 Civil Defense
- 03 Defense systems
- 03/01 Antimissile Defense Systems
- 03/02 Antiaircraft Defense Systems
- 03/03 Antisatellite Defense Systems
- 04 Military Intelligence
- 05 Logistics, Military Facilities and Supplies
- 06 Military Operations, Strategy and Tactics
- 06/01 Naval Surface Warfare
- 06/02 Undersea and Submarine Warfare
- 06/03 Chemical, Biological and Radiological Warfare
- 06/04 Nuclear Warfare
- 06/05 Space Warfare
- 06/06 Land Mine Warfare
- 06/07 Unconventional Warfare.

For subject categorization within the noted International Aerospace Database managed by the National Aeronautics and Space Administration (NASA), as well as for the printed version of it known as STAR (Scientific and Technical Aerospace Reports), NASA uses its own subject categorization scheme. It consists of roughly 90 categories (ranging from 01: Aeronautics, general, to 93: Space radiation) without further subdivisions. STAR citations often include a reference to the COSATI subject categorization scheme. So a report, filed in the STAR printouts under 02 (Aerodynamics), may show the respective COSATI code 01A (Aerodynamics).

The AGARD Index of Publications, produced by NASA, of course uses the NASA subject categorization system as well, but without references to the COSATY classification. The references to AGARD publications in the NTIS data base therefore have the respective NTIS subject codes.

It becomes obvious that each information service uses a subject categorization scheme that best suits the purpose of the system. The main idea is to subdivide, for practical reasons, the immense number of documents into subsets, which allow better control and handling. The three main principles to follow for subject classifications are:

There must be a clear delimination between adjoining classes, groups, and subgroups. Difficulties in applying subject category codes to documents are an indication for missing disjunctions.

The Procedures for applying subject categorization codes must be clear, precise, and applicable.

And, last but not least, the best classification system is the one whereby only one subject classification code is assigned to each document.

DOKFIZBw, which, of course, has built its own very sophisticated und thereby problematic subject classification scheme. It consists of 76 groups and a total of nearly 900 subgroups. Unfortunately, it allows to assign up to six different subject catogories for each document. This makes this valuable tool completely useless for the sorting of documents by subject matter in announcement bulletins and abstracting journals, and for all statistical evaluations in the data base. It is hardly usable for document distribution on defined user interest profiles, and it is only of limited use for information retrieval. However, as it is badly needed for the grouping of descriptors in the DOKFIZBw Thesaurus, it at least serves one purpose out of the intended five, as stated at the beginning of this chapter.

The first step in content analysis, then, is to decide on the overall topic of the document, identify the corresponding subject classification code in the classificastion scheme used by the information service, and enter it into the appropriate data field of the reference.

6.2 Indexing

Indexing is the second step in the process of content analysis, whereby index terms, or descriptors, are applied to the reference in order to make it retrievable in the data base. While subject classification serves several purposes, indexing is only focused towards the information retrieval process, at least in information systems of the type we consider in this paper. The word indexing is used to describe the process of applying index terms, as well as the result of this process, as we will see later on.

Descriptors are words, combinations of words, or even short phrases, which are laid down for

compulsory use in a set of rules, called 'Thesaurus'. The thesaurus contains all vocabulary which is eligible for indexing, and it regulates their use as well. Terms not included may not be used for indexing. By use of the thesaurus, the indexer creates a logical, unmistakable, and reversible relation between the conception, the idea, the image of a material or immaterial object, and its verbal expression.

We call this process terminological control. Terminological control is aimed at eleminating all ambiguities of natural language, as well as of technical languages, and terminologies. It must ensure that all indexers working within the system use one and only one descriptor for one and the same subject, or facts. And, furthermore, that this descriptor can be reliably reconstructed by a different person trying to retrieve the reference later on.

A conception is the intellectual idea of a material or immaterial object. In the German language, we have the word 'Begriff' which is related to 'greifen' and really means to grasp something, namely with ones mind. A conception, therefore, is an object of our reasoning. The characteristics of a conception are specified by its definition. Human communication, however, uses languages. Conceptions, thus, must be expressed through words. Therefore it is essential to represent a conception through a verbal representation, its term (Figure 6).

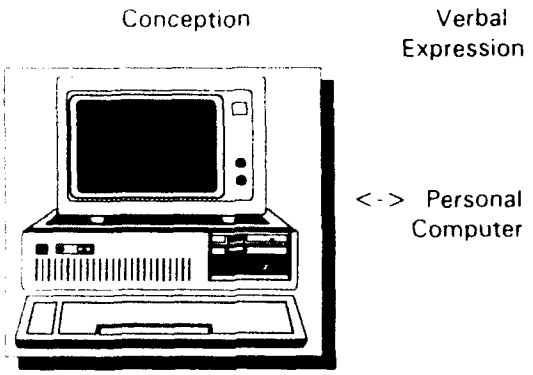

Figure 6

In documentation work it is essential to differentiate between these two elements, conception and term. In natural language, we accept synonyms and polysems. We talk of synonyms, if we have more than one terms for one and the same object. Some examples: we talk of aircraft, or airplanes, meaning exactly the same object, or of heavy water, which is the same as deuterium oxyde, frequency converters instead of frequency changers, earphones instead of headphones. True synonyms, such as engine and motor, poor or indigent, taxi or cab, place or site, are not too common, depending upon the respective language. More often are quasi-synonyms, such as pistols and revolver, rupture and burst, control and supervision, or rods and bars. There are certain differences in the characteristics of the terms, expressed by differences in the definitions. However, for the practical use in the respective information system, they can be treated as the same object, or conception, and, therefore, become synonyms for the system. Obviously objects, which are considered to be quasi-synonyms or even synonyms in one system, may be considered as two different and well distinguishable terms in a second system, and they will be treated as such in the two thesauri. For example, the DTIC thesaurus DRIT (7) considers the descriptor 'ammunition' to be a narrower term to the descriptor 'ordnance', whilst the NATO Thesaurus (8) treats 'ammunition' as a synonym or quasi-synonym to 'ordnance'.

Polysemy, on the other hand, may cause confusion through ambiguities. One and the same word, or term, may have two or more different meanings. The term 'response' might be either an answer, or a reaction, 'bearing' might be used in the context of support for a wheel axis, or as a direction, 'panel' might mean an organizational body such as TIP, but also the filling of a door, 'intelligence' is used to qualify the intellectual properties of an individual, but it may refer also to part of military information services.

6.2.1 Thesaurus Structure

What has been said about subject classification schemes earlier in this paper holds true for thesauri as well: There is no 'best' thesaurus, there is always just the best-suited thesaurus, namely best-suited for the respective information system, and its specific user requirements. But there are quite a few similarities among thesauri, and the principles for their structure and layout are comparable. The data base "Thesauri", available through the ECHO host of the European Commission, lists more than 1000 thesauri, covering all fields of science and

technology. It shows their different structures, lists their fields of coverage, and is a valuable tool for information specialists doing thesaurus work.

Subject classification scheme and thesaurus are closely related to each other, in fact one should think of the two as the two sides of a medal. The subject classification scheme arranges the descriptors in a subject oriented systematic order, while in the thesaurus they are listed in alphabetical order. Thus, even if these two tools for the content analysis are discussed seperately, one must realize the fact that they actually must be considered as one instrument. So, often the subject classification is the systematic part of a thesaurus.

6.2.1.1 Alphabetical Entries

A thesaurus is definitely more than a simple alphabetical list of words, combination of words, or short phrases, which may be used to index documents. What transforms a simple list of words into a thesaurus are the relations, which exist between its entries. To discuss these relations, it will be best to examine a few sample entries, all taken from the DRIT, the DTIC thesaurus, or to be more precise, from its first part, called posting terms.

(1) The descriptor, the main entry in the posting terms part of the thesaurus, may stand for itself, without any further additions:

CONVECTION
MILITARY LAW
COOLING AND VENTILATING EQUIPMENT

(2) A scope note may define a descriptor, and/or may limit the meaning or usage of it:

INVERTERS
Devices that convert direct current to alternating current.

DESERT TESTS
Tests conducted in deserts or desert-like environments to determine the effects of low humidity, high temperature, dust, sand, etc, on ordnance items, materials, personnel, etc.

SMOKE GENERATORS
Devices that produce smoke, for screening or signaling. For similar devices that are delivered by means of special ordnance items such as grenades, bombs, projectiles, etc see Smoke Munitions.

(3) Descriptors may have one or more UF (Used For) entries. In these cases, the descriptor is to be used for any of the terms following this notation:

AIRCRAFT
UF Airplanes

CLOCKS
UF Electric Clocks
Stop Watches
Wrist Watches

COMBINATORIAL ANALYSIS
UF Design(Mathematics)
Enumeration Theory
Factoral Experiments
Latin Squares
MacMahon's Theory
Rotable Design

(4) Descriptors may have one or more UFC (Used For Combination) entries. The descriptor, together with one or more other descriptors, is to be used for any term following this notation:

CLOCKS
UFC Aircraft Clocks

The entry under aircraft clock advises the indexer to use the two descriptors "Aircraft Equipment" and "Clocks" in combination for his indexing.

DAMAGE
UFC Atomic Bomb Damage,

which is to be indexed by using the combination "Damage" and "Nuclear Explosion".

RANGE FINDING
UFC Radio Ranging Systems
Television Ranging Systems

which are to be indexed by using "Radio Equipment" and "Range Finding" respectively "Range Finding" and "Television Equipment".

(5) The BT (Broader Term) notation indicates, that this descriptor represents a broader class, which includes the main entry:

CREWS
BT Personnel

INFRARED SPECTROMETERS
BT *Infrared Equipment
*Spectrometers

FIGHTER BOMBERS
BT *Bomber aircraft
*Fighter Aircraft
*Jet Aircraft

The (*) symbol in front of a broader term indicates the existence of a further broader generic level of terms. Looking up the BT entry "*Fighter Aircraft" from our last example, leads to the broader term "*Military Aircraft", and, repeating this step, we are referred to "Aircraft". ("*Jet Aircraft", by the way, leads of course directly to the highest level entry "Aircraft").

(6) The NT (Narrower Term) notation indicates, that this descriptor is more specific than the main entry:

ELECTRONIC INTELLIGENCE
NT Radar Intelligence.

MILITARY PLANNING
NT Air Force Planning
Army Planning
Marine Corps Planning
Naval Planning.

MICROWAVE ANTENNAS
NT Cassegrain Antennas
Horn Antennas
*Lens Antennas.

In the NT relation, the (*) symbol signals the existence of narrower generic level of terms. Looking up "*Lens Antennas", we find the entry "Luneberg Lens Antennas". Again, this may follow through more than one hierarchical level.

(7) The "Use"-Reference, finally, refers the user of the thesaurus to one or more preferred descriptors. In these cases, the main entry is a non-descriptor, a so-called lead-in term. The use-reference is used to eliminate unwanted abbreviations or acronyms, as well as to enforce a certain form of word spelling, and the like. The use reference always reciprocates with a "UF" reference, or a "UFC" reference.

ORAD
use Optical Radar.

DE-ICING SYSTEMS
use Deicing Systems.

HEART-LUNG-MACHINE
use Heart
and Lung
and Mechanical Organs.

All these relations may be combined, so that the complete entry to a descriptor may well show a scope note, advise on a 'used for' or a 'used for combination' preference, and relate to broader terms and narrower terms. Annex C gives a complete sample entry, again taken from the DRIT.

Some thesauri also specify another relation: Related Terms are not considered as belonging to the same generic class as the descriptor in the main entry, but as having close association or relationship to it. A few examples, taken from the Thesaurus of Engineering and Scientific Terms (9):

GLASS
RT Ceramics

MILITARY AIRCRAFT
RT Airships
Commercial Aircraft

RECREATIONAL FACILITIES
RT Auditoriums
Cultural centers
Lakes
Morale
Skiing
Urban planning

Especially the last example illustrates some of the problems with this relation: There are actually 20 (!) related terms listed for the main entry recreational facilities. However, it is possible to expand on this number by simply adding all sort of sports, activities, etc, provided they are thesaurus descriptors. This, of course, will blow up the volume of the thesaurus, without adding much to its use, and comfort.

6.2.1.2 Hierarchical Index

In addition to the main (alphabetical) part, a thesaurus may have a hierarchical display, which shows the complete family of descriptors with their generic relationships. This part offers points of entry, especially for information retrieval purposes. It is a good reference tool, and is intended to add a browsing feature in determining the best terms for retrieval.

To use this part of the thesaurus, it is necessary to first look up the descriptor in the alphabetical part. If no BT is listed beneath it, the descriptor itself will be at the top of a hierarchy. So it can be located directly in the hierarchical index. If, however, a BT is listed, this BT must be located in the posting terms section, and this process might have to be repeated, until the located descriptor yields no BT. Now, the top of the original term has been identified, and can be looked up in the hierarchical index.

A simple example, again taken from the DRIT, shows the full hierarchy for the descriptor 'Hazards':

HAZARDS
(1) Fire Hazards
(1) Radiation Hazards
    (2) Laser Hazards
    (2) Radioactive Contamination
        (3) Fallout
    (2) Radioactive Wastes
    (2) Reactor Hazards
(1) Toxic Hazards

The broadest term appears farthest to the left, the more specific terms are listed below, and indented to the right, according to their respective hierarchical level. A complete hierarchy for the descriptor 'Organizations', specifying nine hierarchical levels, is shown in Annex D.

6.2.1.3 KWOC

Another helpful tool for indexing as well as for information retrieval is the Keyword Out of Context (KWOC) display of the descriptors, which may be an additional part in each thesaurus. This listing provides an alphabetical entry to the vocabulary on an individual word basis, regardless of the location of the word in the alphabetical entry list. Again an example from the DRIT:

CABLES
Aircraft Control Cables
Cables
Coaxial Cables
Electric Cables
Liquid Filled Coaxial Cables
Mechanical Cables
Multiconductor Cables
Pulse Cables
Radiofrequency Cables
Towing Cables

At first sight, this list looks like a typical entry in the hierarchical index of the thesaurus. But a crosscheck with the entry 'Cables' shows that the two descriptors 'Pulse Cables' and 'Radiofrequency Cables' are part of another hierarchy: they are listed under 'Transmission Lines'.

The experienced indexer will certainly use all available help offered by a well-structured thesaurus. The question whether a thesaurus is available online to the indexer, or if he has to use a printed version, is of practical importance. But the quality of his work, the precise representation of facts, statements, reflections, and arguments by the use of descriptors to ensure effective information retrieval, is mostly effected by the quality of the thesaurus, its structure, and its comfort in everyday use. The same holds true for the retrieval process: An online thesaurus will certainly be appreciated for its comfort, the effectiveness of online searching, however, will mainly depend upon the quality of the thesaurus.

6.2.2 Thesaurus Work

How to really work with a thesaurus, will be discussed in the next section. At this time, just a few words about the work involved to create a thesaurus, and the efforts which are necessary to maintain it properly. The number of descriptors in a thesaurus will largely depend upon the scope of the respective information system, its area of interests, its subject fields, the number of documents added to the system each year, and many more factors of influence. The DOKFIZBw thesaurus, for example, registers about 20.000 descriptors, DRIT about 15.000, the NATO thesaurus about 18.000, the 'USE'entries, which lead the indexer to the preferred descriptor, not included. But there are also thesauri with only some thousand or even a few hundred descriptors, for example the Coal Taxonomy Thesaurus of Terms (app. 1200 descriptors), and the Thesaurus for the National Neighborhood Information Exchange (app. 450 descriptors).

The number of descriptors depends also largely on the respective language of the thesaurus. If a language, such as German, prefers to construct specific words by just contracting two or more independent words to one new word of a very specific meaning, a thesaurus will certainly contain more

descriptors than in a language such as English where terms are constructed quite differently. The four German words 'Kampf' (combat), 'Stiefel' (boot), 'Sohlen' (sole), and 'Kleber' (glue) are unhesitatingly contracted into the one word monster 'Kampfstiefelsohlenkleber', meaning a glue to attach the sole to a combat boot. Now, if a thesaurus wants to reduce the need to enforce word dissection, and use composite words wherever practicable, a German thesaurus will list a high number of so-called pre-combined descriptors.

To build a thesaurus from scratch, is certainly hard work. It takes many man months, probably years, and knowledgeable personnel. To accumulate the vocabulary is certainly the easy part of the work. To structure it, to eliminate synonyms and quasi-synonyms, to decide on the hierarchic level of descriptors, and especially to generate the relations, is the real challenge. In more technical oriented subject fields, the relations are in most cases indisputable. In social sciences however it may cause problems to properly relate descriptors such as 'education' and 'training', or 'knowledge', 'insight', and 'experience'. To adapt an existing thesaurus to ones own needs, is certainly much easier.

A thesaurus requires constant attention and work in respect of development, adjustment, and adaptation in response to technical innovations, changes in terminology, and scientific progress. This work should be coordinated by a focal branch, the real work, however, the suggestions for new descriptors, the stimulation, and the expert knowledge for definitions must come from the specialists, the indexers, responsible for the different subject fields. Thesaurus work is in most information services done as teamwork by thesaurus commissions. These commissions meet at regular intervals, discussing new proposals, deciding on relations between descriptors, thereby developing and updating their indexing tools. In DOKFIZBw, each of the existing three different thesaurus commissions (military sciences, technical sciences, social sciences) meet once per year. During the last session in late February, 1992, more than 200 new descriptors, 500 deletions, and 600 relations were approved by the commission.

6.2.3 Indexing Rules

Structure, lucidity, and ease of handling of the thesaurus are essential for effective indexing. But without precise, clear, and practicable regulations and instructions on how to use this instrument to the benefit of all personnel dealing with information retrieval, the best thesaurus becomes a dubious tool. These instructions must be understood by all persons involved with the indexing of documents. To train the full-time indexers within the system, causes no problems. If, however, on-pay contributors are used to increase the system input, instruction, and supervision of these people require high efforts and continuous attention. In case of DOKFIZBw, more than 65% of the input is generated from outside sources by a high number of contributors.

To ensure the use of descriptors in accordance with the thesaurus rules (existence of a descriptor, style and spelling), all descriptors should be automatically checked during the data entry process against the thesaurus entries. Non-existent entries, misspelled descriptors, wrong word formations and the like will be detected, identified, and forwarded for correction. This process, however, covers only the more formal aspects of indexing. The machine will not detect any intellectual mistakes and no offenses against any of the indexing rules.

Disregarding the many theoretical treatises on sophisticated thesauri, and the complex and complicated regulations for their applications, which have to be observed meticulously, here are just a few basic rules, taken from the DOKFIZBw instructions for indexing documents.

All essential facts, which are discussed within the document, must be indexed in order to find the reference (and thereby the corresponding document) in the information retrieval process. The crucial message is to be seen in the wording 'discussed'. Facts, ideas, and reflections by the author, which are just 'mentioned' in the document, merit no indexing. An example: A document with the title "Shape of Ship Hulls for Destroyers" deals with the main concepts for the form of hulls for speedboats, compares important parameters, such as speed, reactions in rough sea conditions, manoeuvrability, rolling stability, and the like. The author also states that a certain hull form is suitable for the installation of a water jet drive. Now, according to DOKFIZBw rules, this document merits descriptors such as 'Destroyer', 'Ship Hulls', 'Ship Motion', etc or whatever descriptors are offered by the thesaurus. However, the

mentioning of the suitability for water jet engines must not be indexed!

The indexing of the document contents has to be done at the document level, i.e. the descriptors have to be chosen as closely to the document contents as possible. DOKFIZBw enforces 'documentspecific indexing', as we call it. So the fact that the properties of HEP Projectiles are discussed, requires of course the descriptor 'HEP Projectile' (provided the thesaurus offers it, of course), and not the BT 'Ammunition', or even 'Ordnance'. DOKFIZBw indexing rules strongly prohibit any hierarchical indexing. So a line of descriptors, starting from the most specific one, following the line of BT relations, is not used. The rare cases, when the retrieval would favour such an indexing practice, are accepted. They are compensated at least partly by the fact that the very differentiated subject categorization scheme takes care of such hierarchical search strategies.

There is no way of regulating the number of descriptors which should be awarded to a document. As a rule of thumb a number between 6 to 15 descriptors will, in most cases, guarantee a good indexing result. If one descriptor is really enough to retrieve the reference, there is certainly no need for a second one. An analysis carried out in DOKFIZBw has revealed the fact that the number of descriptors per document depend more on the indexer than on the size and content of the documents.

An indexer is often confronted with the fact that a term, which he urgently needs for indexing, is not a descriptor, and is also not made available through any 'use' references. This will in most cases happen when trying to find descriptors for highly specific subjects. In the English language, the UFC reference, as described earlier in the DRIT, is very helpful, and covers a great many of these occurences. In the German language, due to its special preference for long-term constructions, it is impossible to include even a reasonable number of clues. So, instructions on the dissection or splitting up of complex words are essential. The main idea is to first analyse the conception, which is expressed by the term, in its entirity. In a second step, the individual conceptual contents need to be recognized, and expressed through descriptors. In the third step, the most suitable combination of descriptors comprises the indexing. Hereby, the so-called morphologic dissection normally leads to unsatisfactory results. It is essential to use the semantic dissection, as described before. Similar procedures have to be observed for the composition of terms in order to achieve proper indexing.

One word on a special type of descriptors within the DOKFIZBw thesaurus. They are called range descriptors, because they characterize either a field of application, a mark of origin, or refer to a region, or an organizational part of the military establishment. For a document, which describes the military training in the German Navy, in addition to the descriptor 'Military Training' the two range descriptors 'Bundeswehr' and 'Seestreitkraefte' are mandatory. To index a document dealing with military training in the US Marine Corps, the range descriptors 'USA', 'Streitkraefte', and 'Marinekorps' have to be used. There are, in fact, only 13 variations of these descriptors, and their consequent use helps considerably to avoid erroneous selections in retrieval.

6.2.4 Machine Indexing

Indexing documents is a task, which should actually be done by a computer. This holds true especially for the second step, the transformative process of expressing a conceptions through descriptors. Nevertheless, the qualifications for artificial intelligence required to cope with natural language problems is well known from the automated translation fields, and the problems encountered are actually very similar. The main obstruction, however, for machine indexing is the fact that normally the document text is not available in machine readable form.

Documentation theory asks for indexing the document - and not the abstract - as already mentioned before. However, some systems use the abstracting process, i.e. the data input of the abstract, to extract meaningful words and phrases, crosscheck these keywords against their thesaurus, and, possibly, have keywords transformed into descriptors. The indexer then checks the machine-aided indexing product, makes any necessary corrections, deletes unnecessary descriptors, and adds descriptors where necessary. The quality of machine-aided indexing depends largely upon the quality of the respective abstract. If the abstract really covers the main aspects of the document, the indexer will for sure produce a retrievable reference. At

present, the indexer, his skill and experience, are still badly needed. However, through developments in machine indexing, this task will ultimately be done automatically, thereby reducing the costs of the documentation process considerably.

6.3 Abstracting

6.3.1 Function and Significance

In most information services, the third step in content analysis is the preparation of an abstract. The main function af an abstract is to inform the user about the main contents of the respective document. By reading the abstract, the user should be able to decide, whether the document will serve his personal, very specific information purpose, or not. Of course, he will also consider other data elements such as the document title and the source of the document for his decision. In full text retrieval systems, which are used within many information systems, the abstract provides a valuable addition to the main search elements, the descriptors. But it must be clearly understood that the abstract primarily performs an informative function.

Whether to produce abstracts for all the references, whether to restrict abstracting to certain document types, or whether to use references without abstracts, is a policy decision. Abstracting uses valuable manpower, and thereby costs money. So if an information system serves exclusively users within its own organization, physically located within the same building, it might want to restrict its services to retrieve the document references, requesting the user to validate the information value by screening the documents, made available in a library type arrangement. The subject fields covered by the system will also influence the decision on this question considerably. Technical documents, and documents in the fields of natural sciences, have in most cases titles, which are very expressive. A report with the document title "Acquisition and Processing of Informatiom During States of Rapid Eye Movement (REM) Sleep And Slow-Wave Sleep" probably needs no abstract. In many cases, however, especially when not restricting to report type documents, titles will not include enough information to identify the main contents of the documents.

In DOKFIZBw, all references include abstracts. This service is highly acknowledged by all system users. A recent study revealed, actually as a by-product, that nearly 100% of the users welcomed this service, and that they were not prepared to go without abstracts. They stated that their decision to order the full text documents and use them for their purposes was based mainly on the contents of the abstracts. The quality was rated to be high, in nearly all cases the user expectancy was met.

It is the responsibility of the indexer to ensure that the user obtains an objective picture of the contents of the document when reading the abstract. This responsibility is the limiting element in abstracting. Contrary to indexing, where every single working step is regulated, abstracting is the field within content analysis, where the indexer really has a full scope of discretion. He can develop his language abilities, his expressiveness, his wording capabilities.

The abstract is the place to express slight shades of definitions, to incorporate technical terms not listed as descriptors, to place terms from the original document language, to use very specific vocabulary, and nomenclature, in short to use necessary wording, which is normally not included in the thesaurus. Above all, the abstract is the only place in the reference, where the indexer can explain relations and describe connections between facts, ideas, and arguments, and where he can interpret the associations of the author.

6.3.2 Spelling Rules

As stated above, the abstract will in certain cases aiso be of importance for the retrieval. To ensure adequate results for this supporting function, it must be enforced that a few rules are observed when writing abstracts. The indexer is unfortunately not quite as unrestrained as mentioned earlier. For practical reasons, it is necessary to lay down, for example,

- how to use abbreviations and acronyms,
- what to do with mathematical formulas,
- how to express chemical compounds,
- how to write symbols, Greek letters, etc,
- how to treat exponents and index numbers,
- how to treat foreign special letters,
- how to handle digits, numbers, and fractions,
- how to treat dates.

If a language such as German not only allows but often prefers so-called word fragments, whereby in word combinations the common part in both words is replaced by a dash (-), either in the first word, such as in 'Straßen- und Schienenverkehr', or in the second word, such as 'Bauplanung and -ausführung', the use of such phrases must be regulated. In other languages, other problems might exist. This is not the place to give advice for the solution of such problems, I just wanted to address them.

6.3.3. Requirements

To ensure that the abstract is a helpful instrument for the user to enable him to decide whether to procure, and consequently read, the document, every abstract must meet the following demands:

Coverage: The abstract should cover the whole document, not only deal with parts of it. Points of emphasis must be clearly identifiable.

Accuracy: The abstract should reflect ideas, thoughts, facts, considerations, and conclusions of the document precisely and accurately.

Objectivity: The abstract may not contain any assessments made by the indexer. The indexer must omit wordings which contain ratings, or which might be misleading as such.

Intelligibility: The abstract should be written in plain language, understandable, unequivocal, and unmistakable. Short sentences, covering one statement at a time, are preferable to long involved periods. If the indexer wants to emphasize stylistic means used by the author, he may do so be extracting a word-for-word phrase, marking it clearly as a citation.

The indexer will certainly not always be able to meet all these requirements in his routine work. Especially the demands for coverage and completeness are contradictory, keeping the fact in mind that an abstract is restricted to a few lines of text. So the indexer will have to find a compromise between the two.

Some caution is required in the use of 'negative statements'. A sentence which begins with the wording 'In contrast to ...' most certainly contains a true statement. The user gets a very clear and unmistakable description. For the secondary purpose of the abstract, the full text information retrieval, such wordings inevitably lead into the wrong direction. The same holds true for wordings such as '... are not discussed.'. Keeping in mind the fact that information services tend to use abstracts as an aid for indexing, still more rules need to be observed, if the indexer wants to consider these demands as well.

6.3.4 Forms of Abstracts

Two main forms for writing abstracts have been developed: The informative abstract, and the indicative abstract. Which form to use is in most cases a question of preference by the indexer. However it has been proven to be more suitable to use the informative form for short documents, containing few details, and facts. The indicative form is used for longer documents, discussing complex subjects, or trying to solve problems through different solutions. In most cases, a combination of the two forms will be used.

The informative abstract emphasizes the thoughts of the author, not the reasoning. It displays the arguments of the author, not his argumentations. It states the results and perceptions of the author, less the methods and procedures he used to achieve them. It offers facts and data. The indexer virtually places himself inside the document, and presents its contents to the reader. An example sentence from a typical informative abstract, taken from the AGARD Index of Publications :

"The strong trailing-edge shock waves from the nozzle guide vanes of transsonic turbine stages can give rise to interactions with the downstream rotor which are significantly more severe than is the case with lower pressure ratio stages."

Indicative abstracts, on the other hand, explain the reasoning of the author, and his argumentation, describe the procedures and methods he used to get his results, less his thoughts and arguments. The indexer, in this case, steps next to the document, and points to its contents from the outside. An example, again from the AGARD Index:

"Shock structure measurements acquired in a low aspect ratio transic fan rotor are presented and analysed. The rotor flowfield

was surveyed at near maximum efficiency and near stall operating conditions. Intra-blade velocity measurements ..... are presented."

Just a few words to abstracts which are produced by the authors of the documents. It is common practice to use an abstract, which has been written by the author himself, when writing his document. Such abstracts, as long as they correspond to the basic requirements for abstracts mentioned before, are a valuable means for rationalizing the documentation process. Useful abstracts are more likely to be found with reports, and other gray literature, than with journal articles. When using the abstract of an author, it is a matter of honesty to clearly state this fact.

7. DATA ENTRY

Strictly speaking, data entry is not part of the documentation process. Nevertheless, as it finishes up the whole process which has been discussed in this paper, a few lines might well be spent on data entry. All data elements which have been extracted from the document (bibliographic data) or which have been produced within the various steps of content analysis, are part of the reference. This reference is transferred into the data base, where it may be retrieved whenever needed. The link between the reference and the document is normally some sort of reference number in those cases where the document is kept within the information service for user delivery.

Whether data entry is done online along with the working steps of descriptive cataloguing and content analysis, or whether all data are collected on a paper form for subsequent data entry into the data base, depends mainly upon the system layout. As mentioned before, DOKFIZBw generates a high percentage of its input through out-of-house personnel, therefore needing a high data entry capacity anyway. Online input through the indexers is at an experimental stage only.

The main area of concern is not so much the data entry, but the proof-reading which must follow this initial step. Certainly, mistakes in spelling, ommission of words, and the like will easily be detected. But to compare numbers, names, and codes with the original, requires much concentration and accuracy. Of course, proof-reading must be done prior to finally clearing the data for the inclusion into the data base. Therefore, online data entry is normally done into some preliminary data base, strictly speaking, it is not really 'online'!

Once the data have been finally cleared and released, the references are available for retrieval. Provided that the indexer as well as the personnel responsible for the descriptive cataloguing have done their job properly, the references may be retrieved to the benefit of the users.

8. DOCUMENT COLLECTION

At the end of the documentation process, document and reference become seperated. Whilst the reference is transferred to the data entry section, the document is forwarded to the document collection, where it is stored, and kept ready for further use.

Most documents are still produced in paper form. To store large numbers of paper documents, however, requires much storage space. In many information services, the document collection is kept in a microform, preferably as microfiche. The medium microfiche is very useful as far as storage, duplication, and mailing are concerned. Its big disadvantage is that many users, especially in military organizations, are not able to handle microfiche documents due to lack of adequate equipment. Reproducing large numbers of microfich on paper, however, puts a high workload on the information system. In DOKFIZBw, for example, nearly 95% of all document requests are for paper copies. This called for reproducing more than 3.500.000 pages in 1991.

Nearly every information system considers the use of optical storage media for the storage of their documents. Such systems are already available, but it will still take some years, before they can be efficiently used within systems such as DOKFIZBw.

9. OUTLOOK

Technology will certainly play an ever increasing role in information business. The availability of documents in machine- readable form, high performance scanning devices with reliable text recognition, economy-priced high capacity optical storage media, and software for reliable text analysis will change the role of

the human in the documentation process. At present, however, he is still indispensable. I, personally, do hope this will last for a long time.

10. REFERENCES

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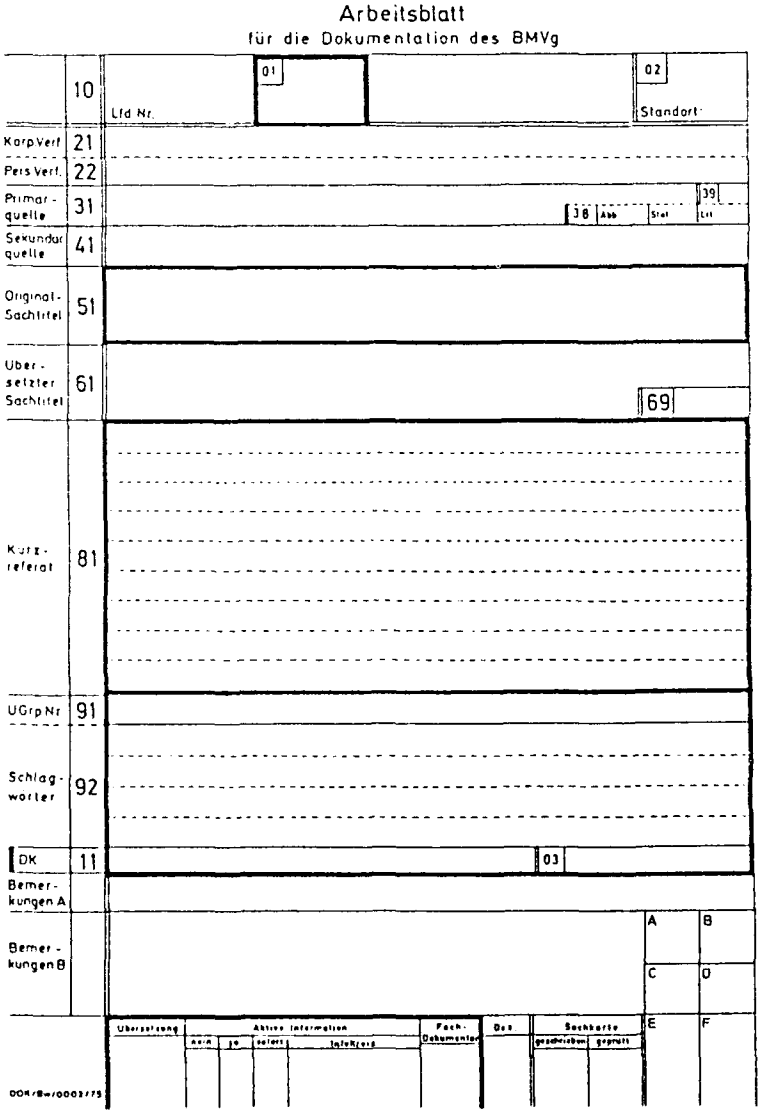
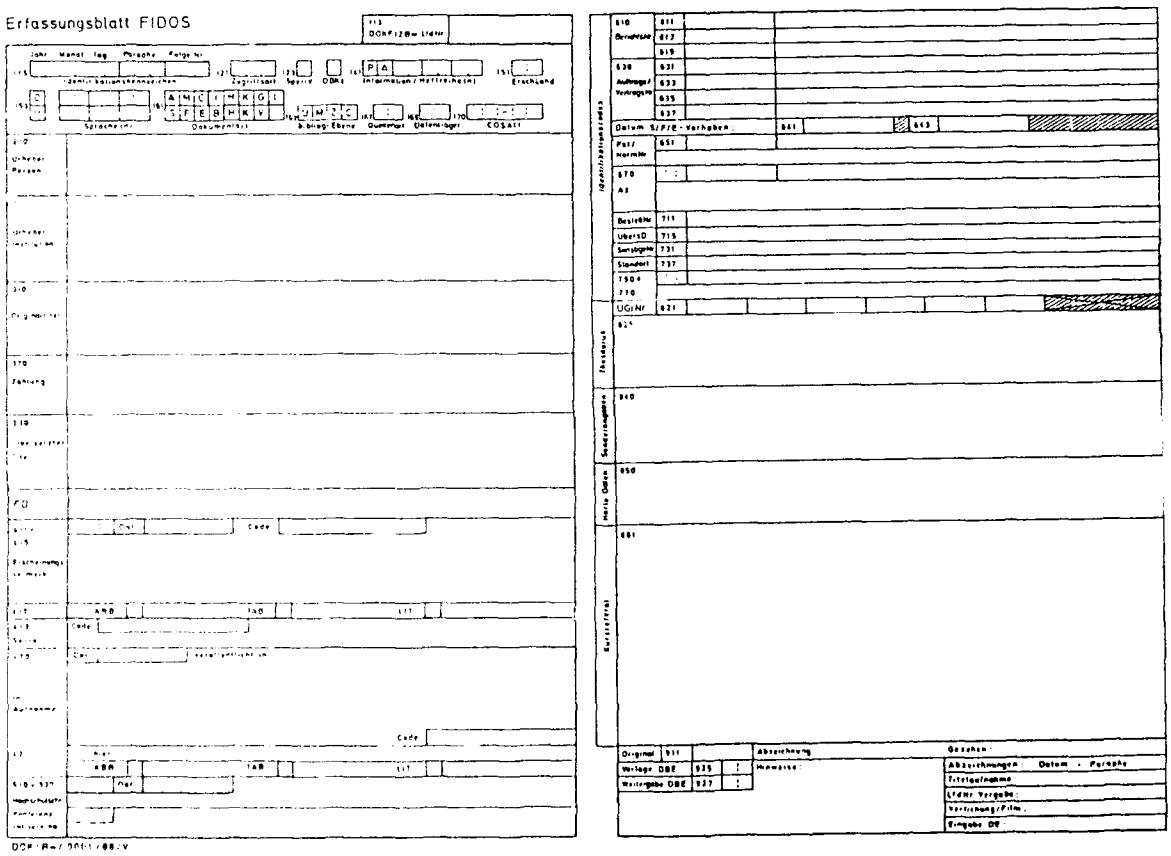
Annex A

DOKFIZBw
Data Record Sheet
(1963 - 1979)



Annex B

DOKFIZBw
Data Record Sheet
(from 1975 onward)



Annex C

DRIT Sample Entry

ORDNANCE
NT *Ammunition
. . .
***Fire control systems**
. . .
*Weapons

FIRE CONTROL SYSTEMS
UF Gunfire control systems
BT Ordnance
NT Aircraft fire control systems
. . .
***Fire control systems components**

FIRE CONTROL SYSTEM COMPONENTS
Devices used in fire control systems or as adjuncts
to gun mounts, missile launchers, and bombing systems.
BT *Fire control systems
NT Bomb directors
. . .
***Sights**
. . .
Target position indicators

SIGHTS
BT *Fire control system components
NT Bombsights
***Gun sights**
. . .

GUN SIGHTS
BT *Sights
NT Gyroscopic sights
. . .
***Optical sights**
. . .

OPTICAL SIGHTS
Sights with lenses, prisms, or mirrors used for
laying weapons or for aerial bombing.
UF Stadiameters
BT *Gun sights
NT ***Perioscopic gun sights**
Telescopic gun sights

PERISCOPIC GUN SIGHTS
BT *Optical sights
*Periscopes
NT **Reflex sights**

REFLEX SIGHTS
BT *Periscopic gun sights

Annex D

DRIT Sample Entry
(Hierarchical Index)

Organizations
- (1) Corporations
- (1) Labor Unions
- (1) Military Organizations
  - (2) Air Force
    - (3) Air Defense Command
    - (3) Air Force Logistics Command
    - (3) Air Force Systems Command
    - (3) Strategic Air Command
    - (3) Tactical Air Command
  - (2) Army
    - (3) Field Army
  - (2) Artillery Units
  - (2) Battle Group Level Organizations
  - (2) Coast Guard
  - (2) Corps Level Organizations
    - (3) Division Level Organizations
      - (4) Brigade Level Organizations
        - (5) Regiment Level Organizations
          - (6) Battalion Level
            - (7) Company Level Organizations
              - (8) Platoon Level Organizations
            - (7) Seabees
  - (2) Marine Corps
  - (2) Military Forces (Foreign)
  - (2) Military Forces (United States)
  - (2) Military Reserves
    - (3) National Guard
    - (3) Reserve Officer Training Corps
  - (2) NATO
  - (2) Navy
  - (2) Squadrons
- (1) Scientific Organizations
- (1) Societies
- (1) Task Forces

TECHNOLOGY FOR LIBRARIES AND INFORMATION CENTERS: A SEMINAR IN GREECE, PORTUGAL, AND TURKEY

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INTRODUCTION

Information technologies are evolving at a rapid pace in today's world. But the electronic technologies needed to transform today's libraries and information centers into electronic "libraries without walls," where an end-user has instantaneous access to all the information needed from a desktop workstation, have not yet arrived. Even so, there are many technologies available today that can be applied in the library/information center environment to yield increased productivity, service and user satisfaction.

However, not all technologies are right for or successful in every environment. Mission, budget, infrastructure, client profiles and staff skills are a few of the "environmental" issues that must be considered when selecting and introducing new technologies into a particular information center. This paper reviews key technologies used in libraries today; it can be used as background for targeting technologies that could be successfully implemented in your own environment to further service goals.

Before focusing on a selection of technologies, you must first focus on the strategic goal of your organization. Is your goal to offer access to a highly specialized selection of material to a geographically dispersed audience? Is it to service a local audience with general needs? Or is it some place between the two? The same technology is not right for every library/information center.

This paper provides an overview of technologies that are readily available and can be applied today. The lecture will supplement this paper with actual case studies and demonstrations of the technology.

INFORMATION TRANSMISSION

Fax

Fax (digital facsimile) is one of the technologies that has great potential to change the way libraries and information centers conduct business and provide services. Fax converts a page of material – printing, writing, drawings, or photographs – into electrical signals and rapidly sends them anywhere in the world over a telephone line. Instead of waiting some unknown amount of time for mail delivery, you only wait seconds per page; the cost is often less

than mail. Fax gives you an exact copy of documents such as orders, invoices, or drawings immediately. It combines speed and accuracy. Figure 1 shows what one type of fax machine looks like; Figure 2 depicts the type of materials that can be transmitted using fax.

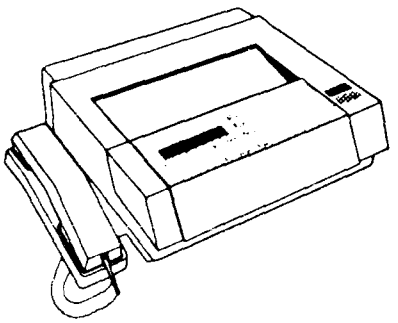


Figure 1. Fax: A Tool for Transmitting Data over Telephone Lines to Yield Paper Output

Figure 2. Sample of Output Capabilities from a Fax Transmission

In 1980, international standards for digital facsimile were adopted. These standards were developed by the Consultative Committee on International Telegraph and Telephone (CCITT), an intergovernmental advisory organization that recommends worldwide communications standards. Since that time, fax units have become a popular and widespread means of communication. What the telephone is for voice, fax has become for printed and written material. Standards will continue to be important to the growth and evolution of fax. Figure 3 illustrates European participation in 9 of the 14 major organizations that develop fax-related standards.

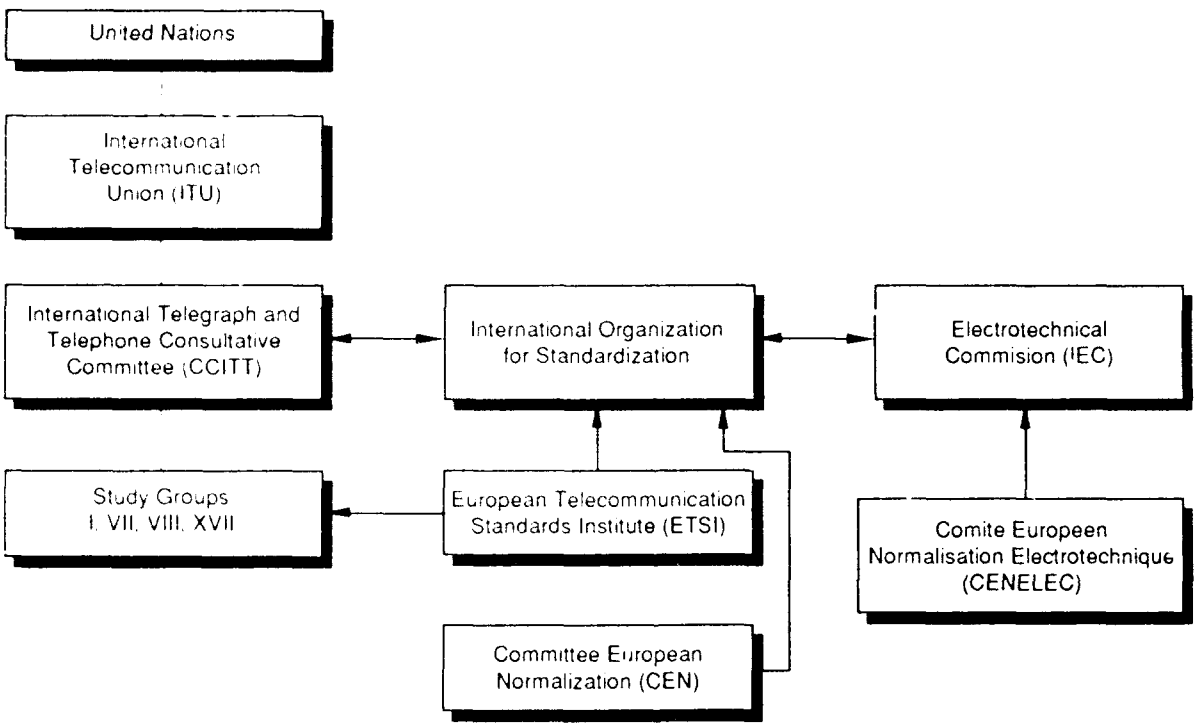


Figure 3. European Participants in the Development of Fax-related Standards

Fax is ideal for worldwide or local communications because no one needs to be at the receiving end when the message arrives. Unlike the telephone, you do not have to make sure schedules coincide in order to communicate. In the library/information center, fax can greatly improve the availability, accessibility and speed of service. Some possible uses are:

- Patrons can fax requests for information to the information center rather than phone or visit.
- Current awareness products can be faxed

to patrons rather than mailed, to make the "current" part of the service even more current. Recipients can mark items they want and fax the request back to the library.

- The results of searches can be faxed to clients so they can quickly determine if they want the full text of an item.

- Short articles or tables of contents can be faxed to users.

- Newsletters about your services, including your fax service, can be faxed to users.

The fax, as currently available, is not the solution to all our document delivery needs. For example, the requirement for color and crispness of image may preclude fax as a satisfactory delivery mechanism. Higher resolutions and color capabilities have been developed, but they are expensive and not in widespread use. Security may also be a concern with some documents. Unless both you and the receiving organization have a fax configuration approved for the transmission of classified information, you will have to use existing approved methods for secure or classified document delivery.

As fax technology advances, the uses for fax in library/information centers will increase also. But we need to recognize the service efficiencies that can be gained from today's fax technology and integrate that technology into our daily operations. How fax is best utilized in your situation will depend to a large extent on the type of services you offer and your user base. Fortunately, once you have a fax machine you can experiment at a low cost to see what works best for your organization. Then you can implement the successful services.

Electronic Mail

Electronic mail is another communication tool which, like fax, frees us from the requirement of "schedule matching" and is much faster than postal services. Electronic mail includes the capability to create messages in electronic form as well as to deliver the messages. Electronic mail is an application of computer networking in which the complexity of transmitting the information from one station to another is transparent to the user. Once again, CCITT standards have led to the widespread availability and use of electronic mail.

Advantages of electronic mail include the ability to send or forward mail to multiple recipients at the same time (see Figure 4). The message is in electronic form; recipients can easily edit it, incorporate it into documents being created locally, forward it to other interested personnel or comment on it and return it to the sender.

The ability to modify the text easily within electronic mail is one of the problems as well as one of the benefits. A user can modify another person's message and send it forward, perhaps misrepresenting the original intention of the sender. Electronic signature packages for electronic mail are not yet widely available or accepted.

Electronic mail is used in library/information centers to perform tasks such as:

- Deliver bibliographies to users. These bibliographies then can be incorporated directly into the electronic documents or reports the user is creating.

- Receive requests for services from users.

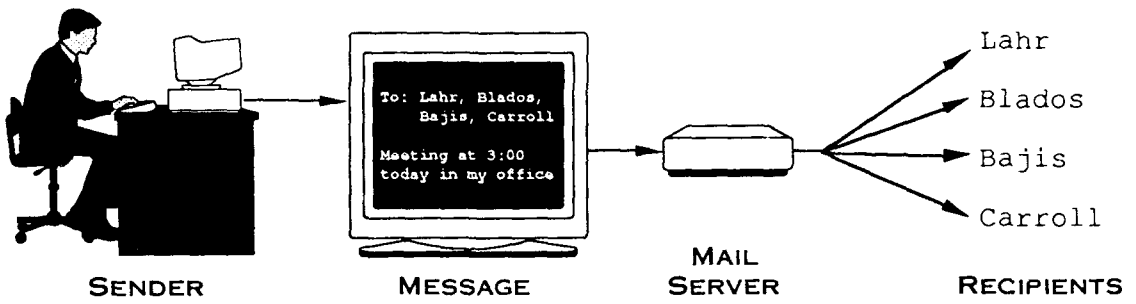


Figure 4. Electronic Mail can be Sent to Multiple Recipients at the Same Time

- Query other libraries concerning the availability of an item.
- Disseminate newsletters and current awareness items to a wide range of users.
- Communicate within the organization.
- Conduct electronic conferencing to determine user needs and service requirements.

The major drawback to electronic mail is that users must have ready access to the system. For example, the AGARD Technical Information Panel (TIP) has tried on several occasions to use electronic mail to conduct panel business. Technically, electronic mail is capable of supporting the panel's needs, but in reality this mechanism has never proved successful because access to an electronic mail system is limited or non-existent in many of the participating organizations. In some cases, participants checked their electronic mailbox only every few months. If electronic mail is not used on a regular basis, it clearly defeats the value of using electronic mail in the first place. In contrast, fax is used by the panel successfully because fax service is more widely available and more widely used in TIP organizations than electronic mail.

When determining if or how to use electronic mail in your operations, carefully consider whether it is widely used within your target population. If it is a commonly used utility, then be creative in structuring or streamlining services that can take advantage of this medium. Conversely, if it is not widely used, do not count on your use of electronic mail to stimulate electronic mail use by your target population. Most likely you will find that neither electronic mail nor the electronic delivery capabilities that are dependent on it are used.

INFORMATION RETRIEVAL

Manual Retrieval

Beside the library's card catalog, the main resources for manual searching are printed indexes and reference publications. These resources are recommended for retrieval purposes if:

- No other source of the information is available.
- The staff, funding or technology infrastructure needed to support automated methods of retrieval are not available.

- The question is simple and can be answered quickly by going to several "high probability" sources that can be consulted by the librarian or the customer.

For complex searches, manual retrieval requires a heavy investment of staff time and produces results that do not begin to compare with those produced by automated retrieval methods. If the means for performing an automated search are not available to you locally and you have a requirement for a complex search, contact a colleague in another institution and see if he or she can do the search for you on a reimbursable, barter or gratis basis. Show your organization the type of results available from automated searching, and try to get your management to either bring the capability into your library or provide the funding to buy services from other organizations. If your organization's business success is dependent on getting quality information in a timely manner, then an investment in automated retrieval services is a wise investment.

Online Retrieval

Over 7,000 databases are available online to the public. Many of these databases grew out of print publications. For example, the U.S. National Aeronautics and Space Administration (NASA) Scientific and Technical Aerospace Reports (STAR), which contains references to U.S. and European aerospace reports, started as a print product. Later, in addition to print, it was made available online as a database.

Online searching to answer complex queries or even to answer simple questions that cover a significant time span (for example, items that would be found in multiple volumes of a print product) is quicker, more efficient and often more accurate than manual searching. To do online searching, you generally need:

- Equipment.
- Trained staff.
- Funding to pay for the service.
- Appropriate telecommunications capabilities.

You can choose to subscribe to a search service; in that case, you have only the requirement for funding to pay for the service.

Online retrieval vendors provide systems into which database are loaded and made available to the public. These services may vary greatly in their user interfaces, capabilities, pricing and content. Although certain databases are found on multiple services – the NASA database, for example, is accessible through DIALOG, the European Space Agency (ESA) Information Retrieval Service (IRS), and the NASA Research Connection (RECON) – other databases may be available only through a single source.

When selecting online services, you should consider:

- How many services can you afford to subscribe to, considering cost, staff training and special equipment purchase requirements?
- Which services offer the "core" databases most useful for your clientele?
- What search interfaces are available through the vendors?
- Do you intend to have trained staff do all

the searching, or do you plan to let end users search? Be sure to carefully assess the search interfaces with this in mind.

- How are the services priced?

- How reliable are the telecommunications networks you would use to get to the online services being considered?

If you intend to bring online searching into your library as a new service, start with one service that you think will be the most valuable. Go through the learning curve and work out your service methodologies using that one service. After you are successful with that one service, consider expanding to others.

In terms of diversity, currency and comprehensiveness, online technology is still the clear leader for retrieval. But you need to consider your client base and their needs. You may find that CD-ROM (Compact Disk - Read Only Memory), the latest in new retrieval technologies, is the right answer for you.

CD-ROM

In many organizations, online pricing algorithms, training requirements and the need for reliable telecommunications can be significant barriers to implementing online retrieval services successfully. Acquiring a database on CD-ROM can solve some of these problems. CD-ROM offers fixed subscription rates, negotiated levels of usage at those rates and interfaces that both librarians and end users often find easy to learn. Figure 5 shows a computer with a CD-ROM configuration.

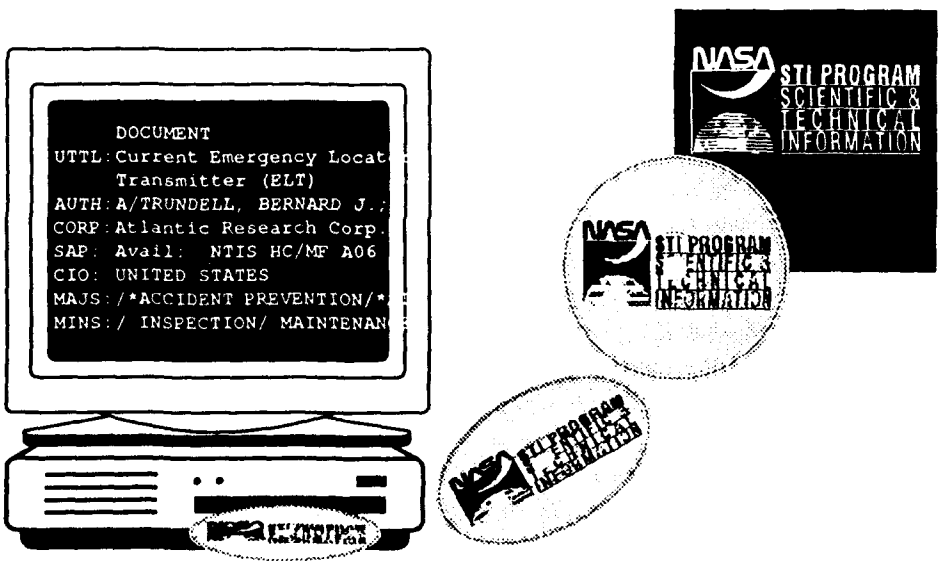


Figure 5. Computer with CD-ROM Configuration

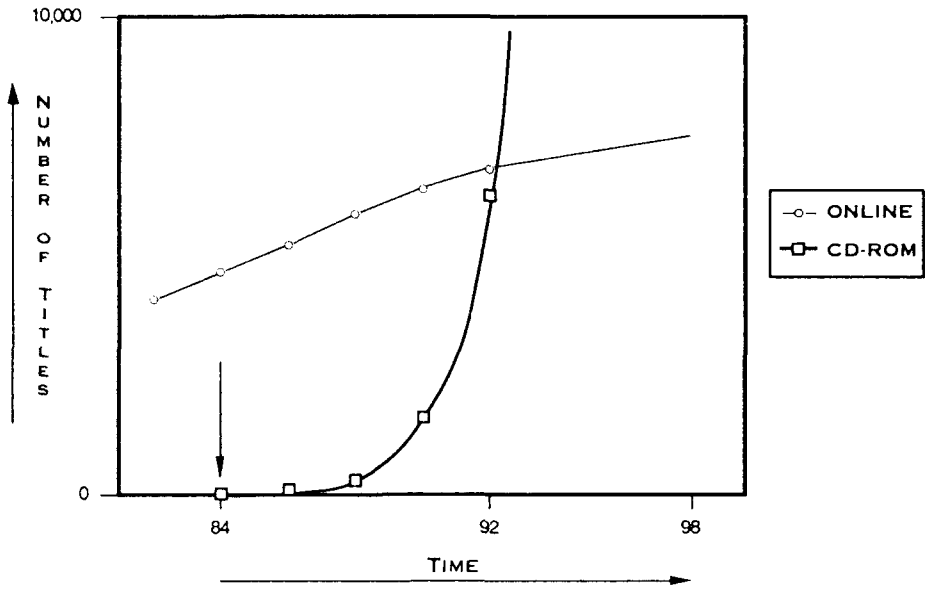


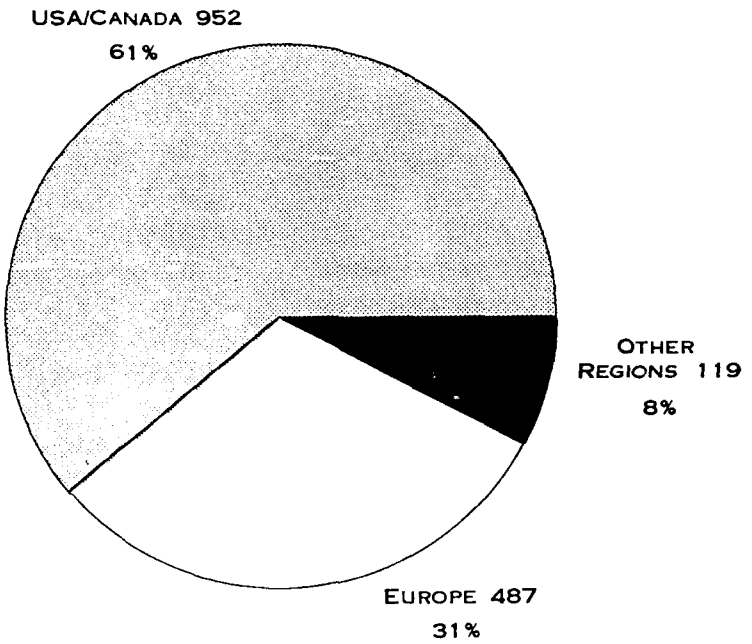
Figure 6. Growth Trends of Online and CD-ROM

What about the issues of comprehensiveness and timeliness? The Optical Publishing Association has forecast that 6,438 titles will be available on CD-ROM by the end of 1992. Industry estimates project that the online market will be relatively stable in terms of new titles, while the CD-ROM market continues on a growth curve (see Figure 6). Most CD-ROM products are updated quarterly or annually; their online counterparts may be updated monthly or biweekly. Many reference publication, however, are updated only once a year – whether print, online or CD-ROM. In these cases, the update cycle does not put CD-ROM users at a disadvantage.

Figure 7 shows how CD-ROM publications are distributed on a worldwide basis. Subject distribution of CD-ROM titles is shown in Figure 8.

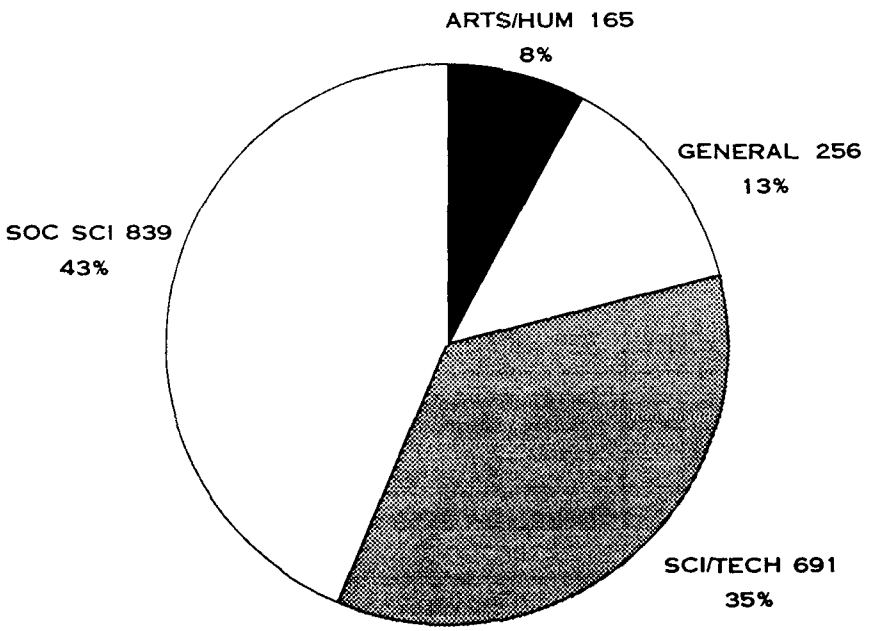
If your users need the most recent information from a source whose online version is updated more frequently than the CD-ROM version, CD-ROM may not do the job for you. You may need to use the online version, or perhaps supplement a CD-ROM search with an online search for the most recent information.

The idea of combining online and CD-ROM services is used by many library/information centers. It is also becoming popular for information producers to publish in both forms to ensure that the information they develop can be used by a broad community with different capabilities. For example, the SARDE (Septim Electronique d'Archivage et de Recherche de Documentation) project developed by the Centre National d' Etudes des Telecommunications (CNET) will utilize a CD-ROM and online dissemination strategy. The Library of the United Nations in Geneva, Switzerland, is working with the Dag Hammarskjold Library in New York, U.S.A. to create a collection of CD-ROMs that will enable simplified conversion of existing databases to a CD-ROM version



SOURCE: CD-ROM COLLECTION BUILDER'S TOOLKIT: 1992 EDITION (WESTON: EIGHT BIT BOOKS, 1991)

Figure 7. Worldwide CD-ROM Distribution



SOURCE: CD-ROM COLLECTION BUILDER'S TOOLKIT: 1992 EDITION (WESTON: EIGHT BIT BOOKS, 1991)

Figure 8. Subject Distribution CD-ROM Titles

with a user-friendly interface. Since CD-ROM technology is disk-based, it can be used in countries with limited infrastructures and telecommunications; online systems can be used in countries with more advanced technology infrastructures.

While most CD-ROMs are designed to operate on IBM-compatible equipment, many are available for the Macintosh. Today, we are even starting to see CD-ROMs designed to operate on both types of equipment. We are also witnessing an expansion of the system requirements for CD-ROMs. The typical system now used to run CD-ROMs is an IBM-compatible with 640K RAM running DOS 3.x. These requirements will increase as the number of multimedia CD-ROM titles increase. For example, the 1991 New Grolier Electronic Encyclopedia contains sound, pictures and high resolution maps. The sound includes clips from famous speeches, musical instruments, birds and mammals. All of these sounds play through the audio jack of the CD-ROM drive. Considering this expected change, DOS 5.x with 1MB RAM is a more appropriate minimum system configuration to think about today.

Figure 9 presents comparison data to be considered when deciding whether online or CD-ROM is right for your library or information center.

Library/information centers are using CD-ROM primarily for:

Reference. Both primary materials and secondary materials such as bibliographic databases are searched.

Technical Processing. Cataloging information, bibliographic verification and acquisition efforts are supported.

Patron Searching. In many library/information centers, patrons are encouraged to do their own searching using CD-ROMs.

	AUTOMATED INFORMATION RETRIEVAL OPTIONS	
CONSIDERATION	ONLINE	CD-ROM
EQUIPMENT	LOWER COSTS THAN FOR CD-ROM	HIGHER COST THAN ONLINE
TELECOMMUNICATIONS	REQUIRED	NOT REQUIRED
TRAINING	INTENSIVE/REGULAR USE	SHORT OVERVIEW
PATRON SEARCHING	DIFFICULT	EASY TO MODERATE
COST	BASED ON SEARCH TIME	FLAT RATE SUBSCRIPTION FOR UNLIMITED USE
UPDATES	EQUAL TO OR MORE THAN CD-ROM	LESS FREQUENT THAN ONLINE OR THE SAME

Figure 9. Comparison of Online Versus CD-ROM Retrieval Technologies

CD-ROM shares with the online retrieval mechanisms the problem, at least from the user's view, that each publisher uses unique, proprietary retrieval software with different user interfaces. The Optical Publishing Association estimates that there are at least 40 proprietary systems available. This causes a problem for users, especially in library/ information centers where many different CD-ROMs are available. If your library/information center will have multiple CD-ROMs from different publishers, be prepared to provide the necessary training and support.

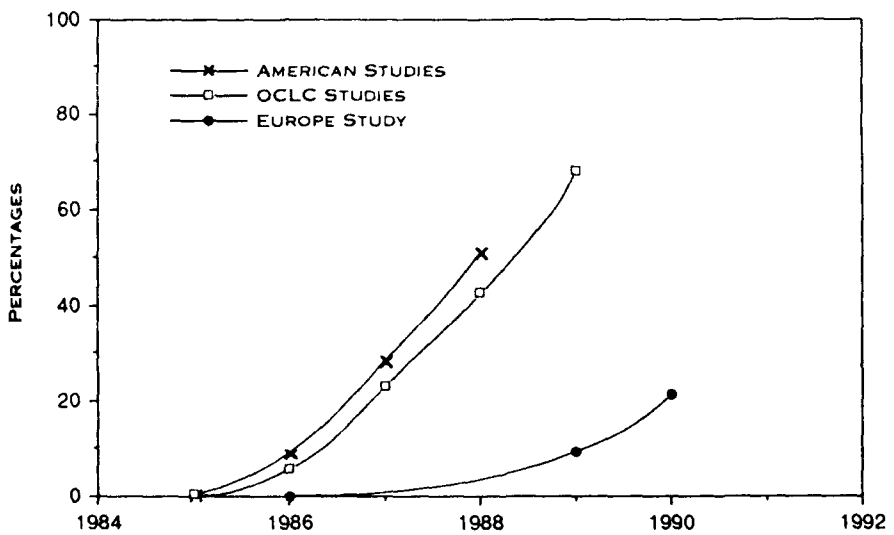
Another issue to consider with CD-ROM is that a user may have to access multiple disks in order to do a comprehensive search. Accommodating multiple disks will require changing disks or purchasing an optical jukebox, which will add significantly to your CD-ROM equipment cost.

CD-ROM Use In Europe

Ching-Chih Chen and David I. Raitt conducted a survey on the use of optical products in library/ information centers in Western Europe. The study was sponsored by the Federation for Information and Documentation (FID). Out of a total of 13,568 questionnaires, 3,310 were answered. Over 9.5 percent of the respondents said that they were using an optical product in their organization.

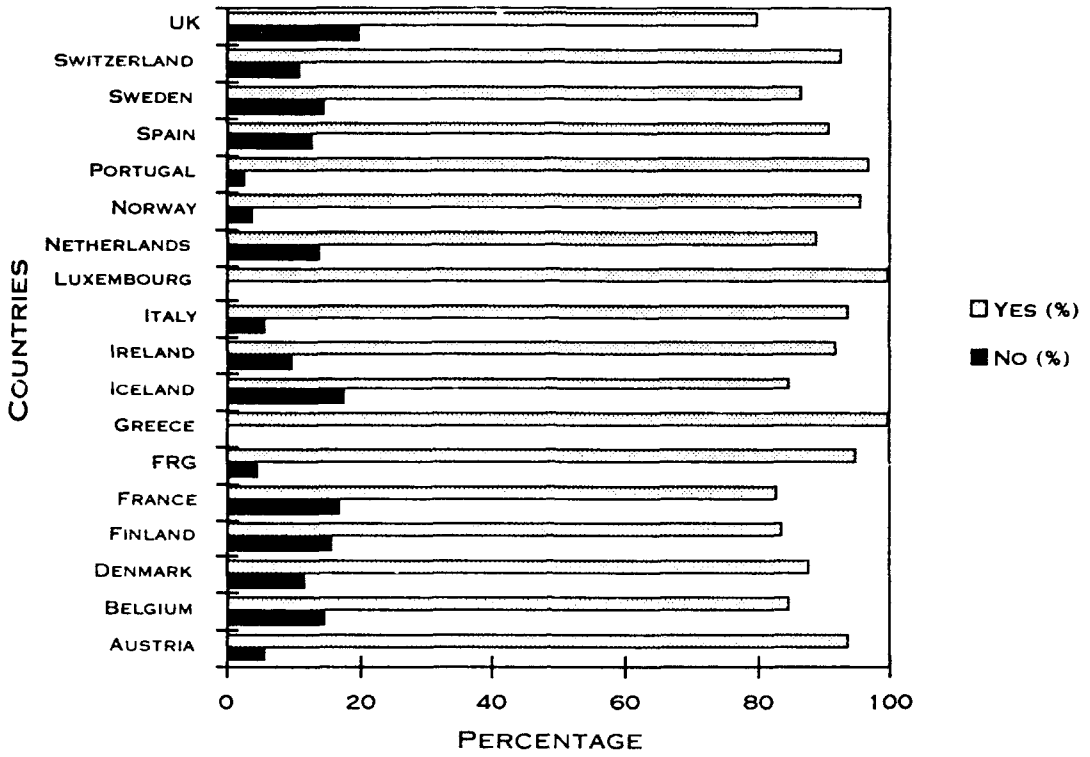
The data from the Chen and Raitt study, shown in Figures 10 through 18, provide insight into CD-ROM use in Europe.

In summary, CD-ROM can provide huge quantities of information in an easily distributed, durable, compact medium. But, as with any medium, you must ensure that the quality of



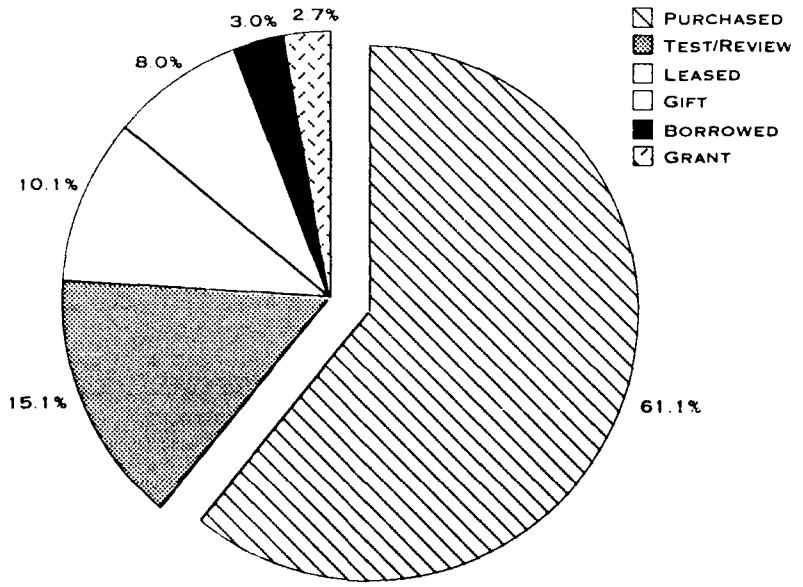
SOURCE: OPTICAL DISKS IN LIBRARIES: USE AND TRENDS (MEDFORD: LEARNED INFORMATION, INC., 1991)

Figure 10. The Growth in Use of Optical Products in American and European Libraries



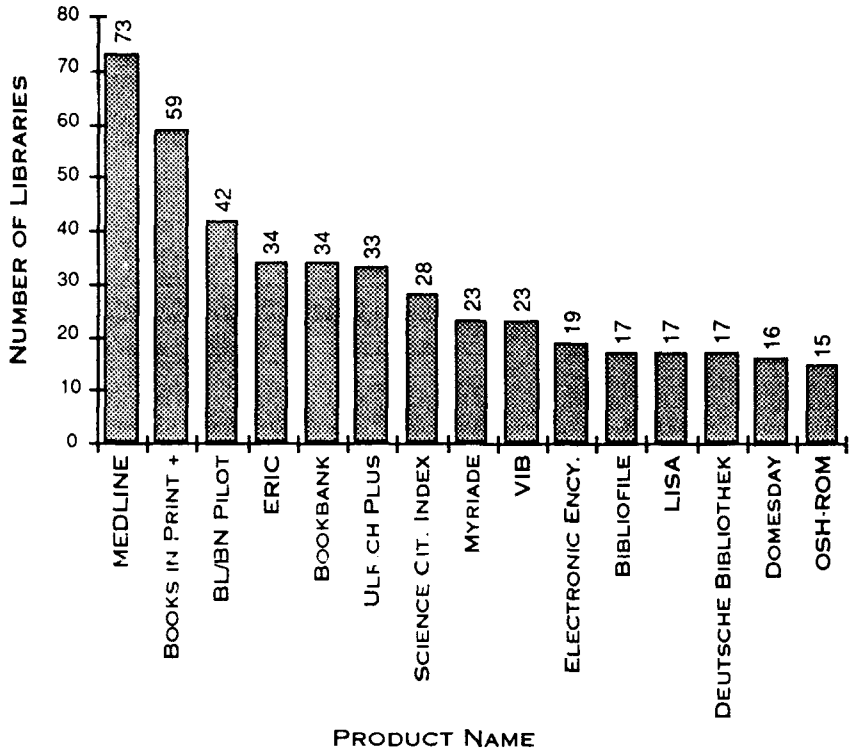
SOURCE: OPTICAL DISKS IN LIBRARIES: USE AND TRENDS (MEDFORD: LEARNED INFORMATION, INC., 1991)

Figure 11. Ownership of Optical Products in European Libraries



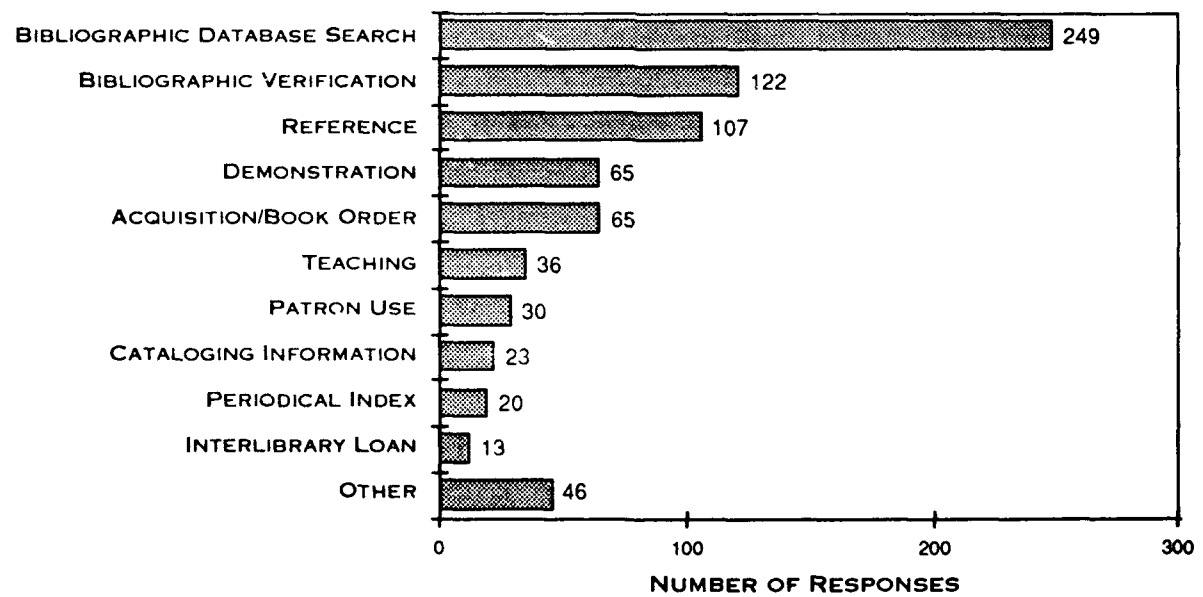
SOURCE: OPTICAL DISKS IN LIBRARIES: USE AND TRENDS (MEDFORD: LEARNED INFORMATION, INC., 1991)

Figure 12. How Optical Products were acquired in European Libraries (1989 Data)



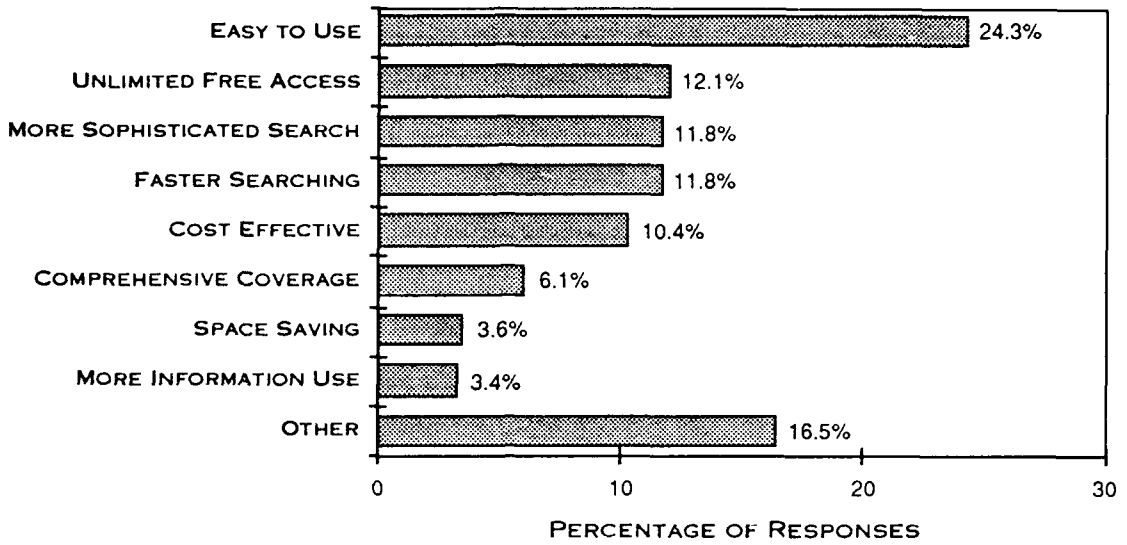
SOURCE: OPTICAL DISKS IN LIBRARIES: USE AND TRENDS (MEDFORD: LEARNED INFORMATION, INC., 1991)

Figure 13. The Fifteen Most Popular CD-ROM Products in European Libraries



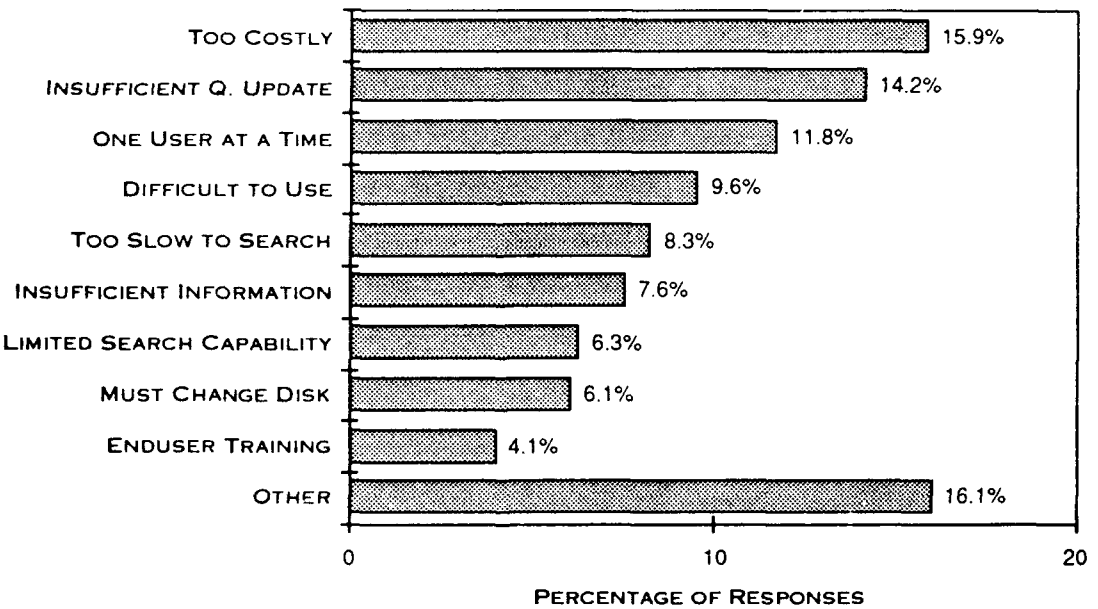
SOURCE: OPTICAL DISKS IN LIBRARIES: USE AND TRENDS (MEDFORD: LEARNED INFORMATION, INC., 1991)

Figure 14. Applications of Optical Products in European Countries



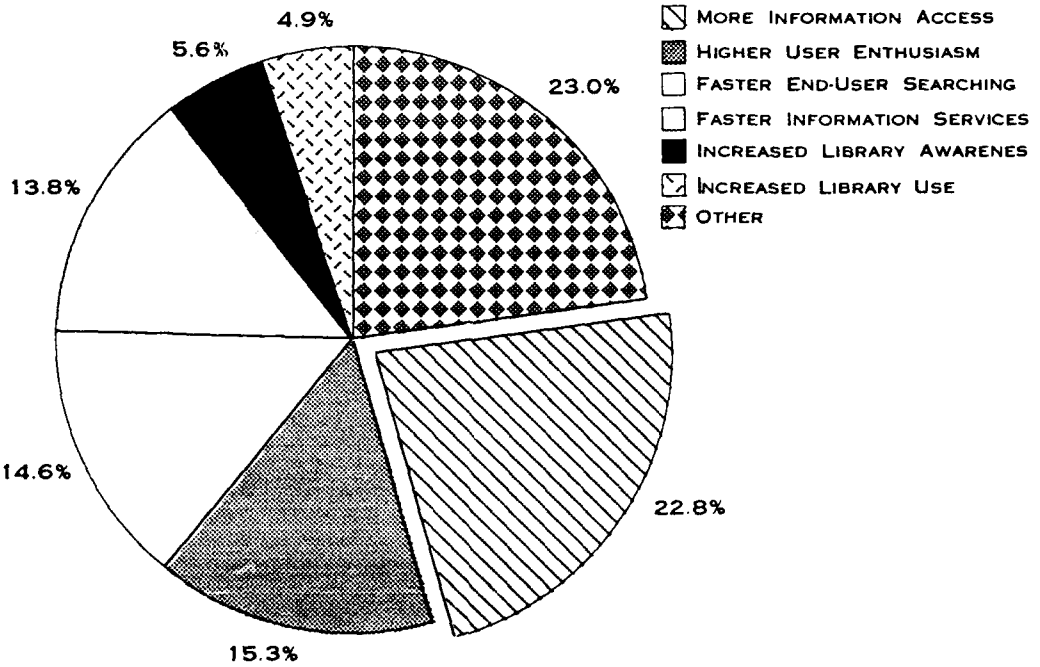
SOURCE: OPTICAL DISKS IN LIBRARIES: USE AND TRENDS (MEDFORD: LEARNED INFORMATION, INC., 1991)

Figure 15. Advantages of European Optical Products Libraries



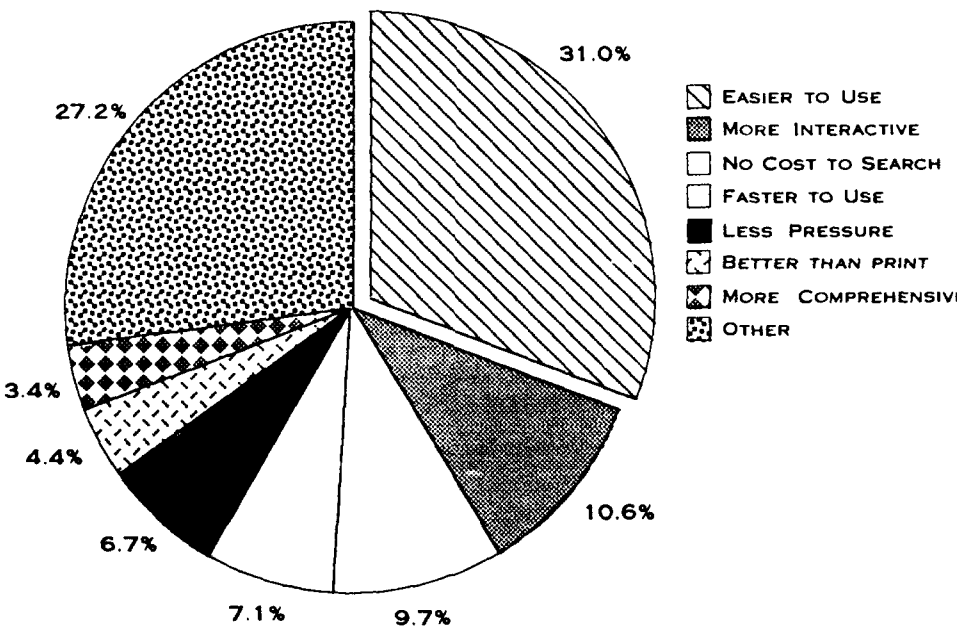
SOURCE: OPTICAL DISKS IN LIBRARIES: USE AND TRENDS (MEDFORD: LEARNED INFORMATION, INC., 1991)

Figure 16. Disadvantages of European Optical Products Libraries



SOURCE: OPTICAL DISKS IN LIBRARIES: USE AND TRENDS (MEDFORD: LEARNED INFORMATION, INC., 1991)

Figure 17. Impacts of Optical Products in European Libraries



SOURCE: OPTICAL DISKS IN LIBRARIES: USE AND TRENDS (MEDFORD: LEARNED INFORMATION, INC., 1991)

Figure 18. How Optical Products Were More Convenient to Use Than Online

the database is good and the organization of the information is useful. As with online services, you should pick a system with a robust retrieval capability that you can utilize to its fullest extent.

Search Interfaces

Most of the online services accessed today first had a terse command-driven interface designed for search "experts" who had completed training courses and spent a large portion of the work day exercising their searching talents. A typical command-driven system query, entered by the user, would look like the one depicted in Figure 19.

As time went on and the number of systems (with different command languages that the "experts" needed to learn) increased, many organizations set out to develop user

Figure 19. Command-Driven System Query

friendly search interfaces to their own or multiple external databases. User-friendly interfaces, as illustrated in Figure 20, were frequently based on a menu-driven strategy where the user only had to fill in the blanks.

The problem with menu-based systems was that users quickly outgrew the canned capabilities and wanted more power to do their searches.

Today there are a plethora of search interfaces available. There exist organizations whose primary business is creating and maintaining search interfaces to multiple online database and CD-ROM systems. Some Integrated Library Systems (ILS) are available that provide a single unified interface to an inhouse library catalog, the library catalog of other organizations, external online databases and inhouse CD-ROM collections. Some inter-

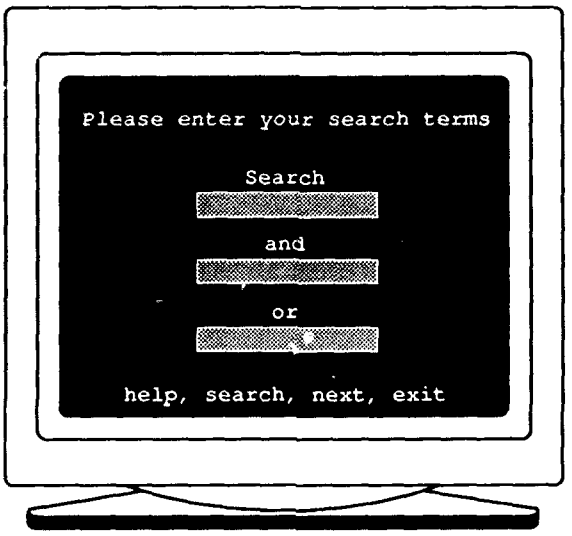


Figure 20. Menu-Driven "Fill in" Strategy

faces are developed to be used through a local workstation; others are available as centralized "gateway" services. Interfaces are designed for both "expert" and end-user searching.

Many of these systems utilize graphical user interface (GUI) technology that makes the computer screen appear as a desktop with windows and icons that can be opened and closed and moved around. Pull-down menus present choices to the user. The user can select an option by pointing and clicking rather than issuing a command. The Apple Macintosh interface and the Microsoft Windows for IBM-compatible PCs are GUIs. Such an interface would look like the one displayed in Figure 21.

Windowing systems that are network transparent and device independent such as X Windows have also been developed. X Windows is based on the client/server model. In this model, the client is an applications program running on the workstation that makes requests of the server for information. The server program, typically running a network server, responds by delivering the information back to the workstation.

The client/server model was utilized by Thinking Machines Corporation in developing their Wide Area Information Server (WAIS) system for retrieving information from databases anywhere in the world. The WAIS interface is based on windowing technology, but the search technique is based on relevance rather than Boolean logic. A typical search session, as described by Brewster Kahle of Thinking Machines Corporation, consists of:

Step 1: The titles of information sources are dragged with the mouse into the Question Window. The Question Window can contain multiple sources. When the question is run,

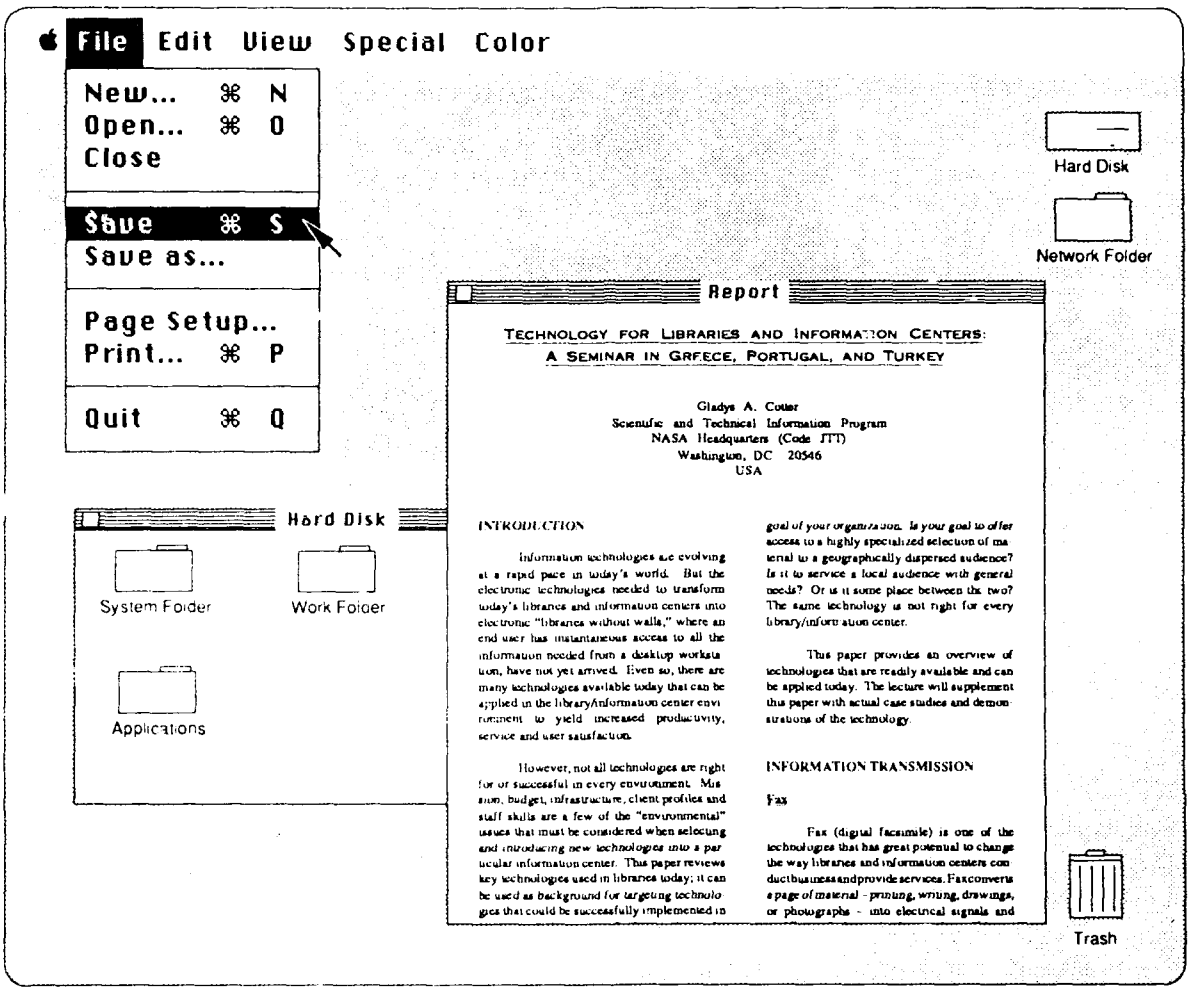


Figure 21. Macintosh "Pull-Down" Menu Interface

it asks for information from each included source.

Step 2: When a question is run, the answer is presented along with a display of titles of documents satisfying the question.

Step 3: To retrieve a document using a mouse, the user clicks on any title.

Step 4: To refine the search, any one or more of the documents that resulted from the original search can be moved to a "Which is similar to" box. When the search is run again the results will be updated to include documents which were "similar" to the ones selected from the first search.

ELECTRONIC PUBLISHING

Desktop Publishing

The availability of word processing and computerized page layout and composition systems on microcomputers has lead to a form of electronic publishing generally referred to as "desktop" publishing.

Desktop publishing is becoming a standard part of personal computing, and its use will grow with the increased availability of personal computers. As computers become available within an organization, computer typesetting and photolithography of computer-generated page images replace mechanical methods of generating printed text; computer text editors and word processors replace manual and electronic typewriters for originating documents; computer graphics and image scanning packages allow graphics and text to be generated and manipulated electronically, reducing manual keying and graphics workloads. For publications such as simple reports, newsletters and brochures, desktop publishing can cut composition costs from $50 U.S.D. per page to $5 U.S.D. or less per page. Desktop publishing can reduce the size of text and make optimal use of the space on a page, thereby reducing the volume of a publication. This feature translates into cost savings from reduced paper and mailing costs. Text can also be edited and reused in future publications inexpensively.

Desktop publishing reduces the time and cost associated with traditional publishing processes. It allows flexibility in the publishing process because it simplifies changing font sizes, redesigning the layouts, incorporating images and the like. It also facilitates joint authoring of reports. Once text is entered into the system, it can be provided in electronic form to a co-author or editor. If both parties are on a network, the document can be shipped electronically using mail or file transfer routines. Alternatively, floppy disks can be shared – but be sure the systems on both ends are compatible.

To do desktop publishing, you need a microcomputer configuration that includes hardware and software with the capability to produce near-typeset quality output using multiple typefaces, sizes and styles, design multi-page layouts and import text from other documents.

Desktop publishing systems can be configured to meet a range of publishing needs. On the low end of the market, personal computer systems can be used to publish simple, low-cost items. Many library/information centers use this type of system for publishing newsletters. A typical low-end desktop publishing configuration, for example, would include:

- A microcomputer with a keyboard and display (about $3,000 U.S.D.).
- Page composition software (about $500 U.S.D.).
- A laser printer (about $2,000 U.S.D.).
- A low-end scanner for image input (about $2,000 U.S.D.).

At the high end of the marketplace we find powerful personal workstations, often connected to Local Area Networks (LANs), which are used to publish high-quality, high-volume, high-complexity items. These systems permit complex manipulations of text, graphics and halftones. Producing a scientific report containing charts and diagrams would be a suitable application for this type of system. High-end systems cost from $30,000 U.S.D. to $150,000 U.S.D., compared to the $5,000 U.S.D. to

$10,000 U.S.D. required to purchase low-end systems. As the performance/price ratio in the computer market continues to improve, the distinction between low- and high-end systems will diminish.

Desktop publishing draws on a number of technologies, including word processing, one of the first technologies used. In many offices, personal computers are purchased specifically for word processing purposes. Word processing facilitates the creation, manipulation, editing, storage and printing of documents. A word processed document contains character-encoded text and instructions (control characters) that govern the screen display and printed format of the document.

One of the drawbacks to word processing is the variety of often incompatible systems. If you plan to share your information with others, make sure that you have compatible systems or know both how to convert from one system to another and that the particular conversion routine yields usable results. Likewise, if you plan to move to a new system, do not forget to plan for conversion as part of the implementation process.

In addition to word processing, desktop publishing uses electronic markup, printer control languages, and page description languages. These technologies are often intended for use on a single, closed computer system. If you intend to exchange documents electronically, you need to consider handling documents in a manner that is independent of the system configuration.

Electronic Text Exchange Formats

Unstructured text can be transmitted successfully across a network to another site. However, this only works for text. If you need to transmit charts, drawings, page layouts and other complex items, this solution will not work.

To address the problem of facilitating document exchange, several international standards have been developed. Office Document Architecture (ODA) is one of these. This standard addresses complex documents that can contain text, graphics, sound, pictures and video. ODA facilitates interchange and remote access to documents by providing a methodology for specifying the content, logical structure and physical layout of a document.

ODA documents can be produced in three forms:

Processable Form. This form allows the recipient to add to or modify the content and format of the document. This is useful for co-authoring documents or for editorial review.

Formatted Processable Form. This form allows the recipient to modify the content, but the format is fixed. This is useful if there is designated standard to which a document's format must conform. Once you put it in the proper format, only the content of the document can be changed.

Formatted Form. In this final form, the document cannot be modified by the recipient. This form is useful for electronic document delivery.

A major limitation of ODA for the AGARD TIP community is that the standard was designed for office documents, not scientific and technical documents that contain complex equations, tables and columns. Fortu-

nately, AGARD TIP members such as the Defense Technical Information Center are experimenting with standards such as ODA. We are hopeful that solutions for the scientific and technical information community will result.

Standard Generalized Markup Language (SGML), another tool for exchange of documents, is an International Standards Organization (ISO) standard for adding tags to documents to indicate document elements such a headings, subheadings, chapters and paragraphs. Because these items are clearly marked in the document, SGML is helpful for information retrieval and automatic indexing. Many library/information centers are looking to ODA and SGML to help automate full text retrieval and electronic document delivery.

Conversion Technologies

It is important to recognize that "non-electronic" information can be "electrified" and incorporated in desktop publishing systems through a variety of means. Conversion of paper documents into electronic form is generally referred to as scanning or digitization. Technologies are available for converting microfiche as well as paper.

Image scanning converts documents by creating an electronic image of a document. This is the same technology used in facsimile transmission. As a page is scanned, the lines are analyzed to produce a matrix of dots, each with a value of light or dark assigned to it, which represents the page. This process is referred to as raster scanning.

Low-end scanners are acceptable for scanning printed text, which is monochrome and has high contrasts. Tonal images such as photographs require more complex scanners, which recognize a grey-scale. Scanners can also be used to digitize color images. As the capabilities of the scanner increase, both the price and the storage requirements also increase.

With basic scanning technology, an item can be incorporated in a document, stored, displayed and printed as required. If more complex manipulation is needed, the raster images must be encoded so they can be changed. Some of the formats for encoding raster images are the Group 3 (G3) format, the Group 4 (G4) format, the Tag Image File Format (TIFF), and the Joint Photographics Expert Group (JPEG) standard.

Optical character recognition (OCR) is used to convert the text portion of scanned images into character code to make the text available for electronic manipulation. Template matching (also called matrix matching) and pattern recognition (or feature extraction) are the two methods of performing OCR. Template matching is the most common method and pattern recognition is the most powerful method.

In order for OCR technology to be more efficient than manually rekeying the same information, the recognition rate must exceed 97 percent. Poor quality type or items such as diagrams and complex scientific formulas will not process well with OCR technology. When items are not recognized properly, manual intervention is required. If too much manual intervention is required, the purpose of using OCR in the first place is defeated. OCR technology works best with clear documents that have black text on a white background.

Two clear benefits of using OCR technology over image or raster capture are:

1. The storage required is greatly reduced because only ASCII code is stored.

2. Information retrieval and automatic indexing can be used on material stored in this format.

This second benefit is important to library/information centers. Frequently, library/information centers use a combination of images and text; the images are used for document delivery and storage, and the indexes to the images are created using OCR-generated text processed with indexing software.

Document Storage and Delivery

Document processing, including the requirements for storage, is addressed in another paper in this series. Therefore, I will only briefly touch on several items here. First, once a document is in electronic format, there are many options available for storage and delivery. Output to paper or to microfiche continue to be viable options. These options can be executed locally or at a remote location. Traditional magnetic storage technologies such as magnetic tape, floppy disks and hard disks are options, and a range of optical technologies can be used. CD-ROM, WORM (write once, read many) and magnetic-optical disks are among the media available.

Which technology is chosen will be largely a factor of service needs, user capabilities and, of course, resources. Many library/information centers use multiple media; it is not unusual to find the same product distributed in both paper and CD-ROM format, for example. One thing seems certain: the power of available systems will continue to increase while the cost decreases. The following charts (Figures 22 and 23) illustrate these trends.

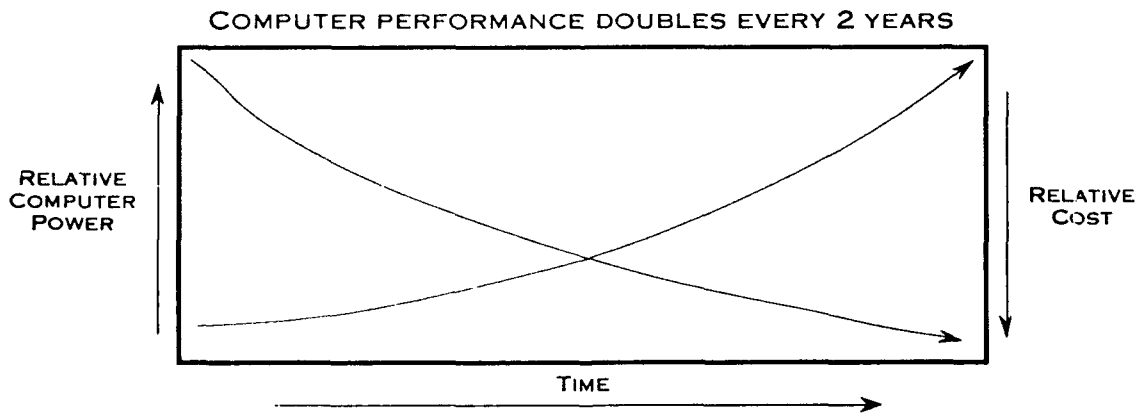


Figure 22. Rate of Technological Change

	COST PER MIP		REDUCTION	
	1988	1991	Change	Percent Per Year
MAINFRAME	$180,000	$100,000	1.6X	14.5%
SUPERMINI	$100,000	$50,000	2.0X	20.6%
WORKSTATION	$10,000	$1,000	10.0X	53.6%

SOURCE: THE TECHNOLOGY RESEARCH GROUP (EDN NEWS, MAY 1988)

Figure 23. Processor Cost Trends

NETWORKING: LOCAL AND WIDE

Library/information centers have used networking technologies for many years. DIALOG, the Bibliographic Retrieval System (BRS) and ESA Quest are some of the well-established services accessible worldwide through telecommunications networks. Online catalog access through networking has streamlined the cataloging process and facilitated interlibrary loan. When a library/information center receives an item to be accessioned, catalogers will search catalogs on the network to see if the item has already been processed. If a cataloging record for the item is found, the library may be able to append an entry to the online record indicating that the library holds a copy of the item. On some shared cataloging networks, the library can add other site-specific information such as index terms or subject headings. Records from these networks can also be downloaded to the local online system for further processing and manipulation.

An ISO standard has been established for interlibrary loan (ILL) applications that can be used for distributed circulation functions. This protocol supports a number of different lending scenarios ranging from the simple model where one library approaches another to borrow an item, to complex ILL networks that involve network routing structures. The ILL protocol uses a simple set of data elements to identify items – not a MARC-structured record.

Downloading is one of the advantages of networking. Whether searching an online catalog, an inhouse database or a commercial database over the network, you have the option of capturing information electronically by downloading it either to your personal computer or to another computer on your network. Once you have captured the information in electronic form you can "post process" it in a variety of ways. Some examples of post processing in library/information centers are:

- Editing search results to provide a user with a customized bibliography.
- Analyzing data elements in a group of subject-related records to see if trends can be identified.

- Merging the results of multiple database searches into a single format and eliminating duplicate citations.

- Creating a local database of records from multiple databases on the network.

Downloaded records also can be electronically disseminated to your user community through file transfer or electronic mail. When downloading information and redistributing, reformatting or reutilizing the information, you must adhere to fair use, copyright and licensing agreements. Some resources available on networks are free to anyone who wants to use them, with no restrictions regarding further processing or distribution of the information. Other resources, notably commercial databases that are dependent on revenues from searches, must have restrictions in order to survive. It is important to use downloading and networking technologies in a manner consistent with the intellectual property rights of the database producers.

Many of today's library/information centers use networks as the foundation of their services. Through the networks they perform:

- Information retrieval.

- Selective dissemination of information.

- Electronic document delivery.

- Electronic document acquisition.

- Shared cataloging.

- Bulletin board services.

- Training and electronic conferences.

An example of how a wide and a local area information environment might be structured is shown in Figures 24 and 25.

Major networks that can be used by library/information centers are being implemented around the globe. Examples of such networks are:

ARIADNE. ARIADNE is being used to establish a widespread infrastructure for the academic and research and develop ment community in Greece. ARIADNE also has gateways to other networks such as EARN and BITNET.

EARN (European Academic Research Network). EARN is a backbone network connecting national and campus networks into a continental network. There are nodes in all Western European countries as well as Cyprus, Turkey, Yugoslavia and Egypt. EARN has gateways to EUnet and JANET.

EUnet. This network is a European-wide cooperative news and mail network used for research and development. Each member country in Europe, including Greece and Portugal, has a EUnet backbone host.

Internet. This network was designed to facilitate the collaboration and sharing of information among government agencies, educational institutions and industry. Internet is a top level meta-network that connects other networks in the United States (U.S.), Canada, Europe, Australia and Mexico. For example, the Internet links to BITNET (U.S.), JANET (U.K.), ARISTOTLE (France) and EUnet (Europe).

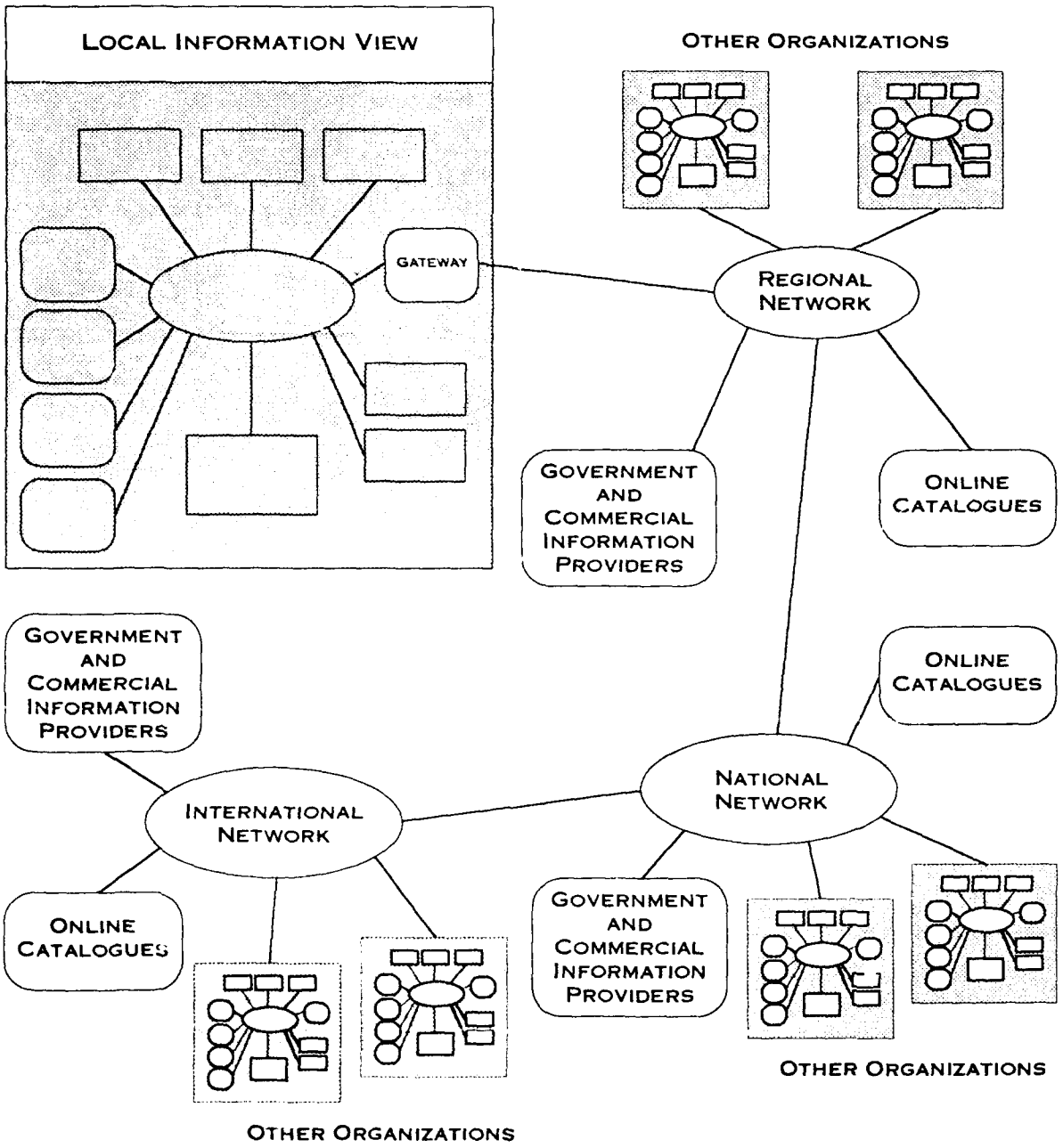


Figure 24. Sample Wide Area Information View

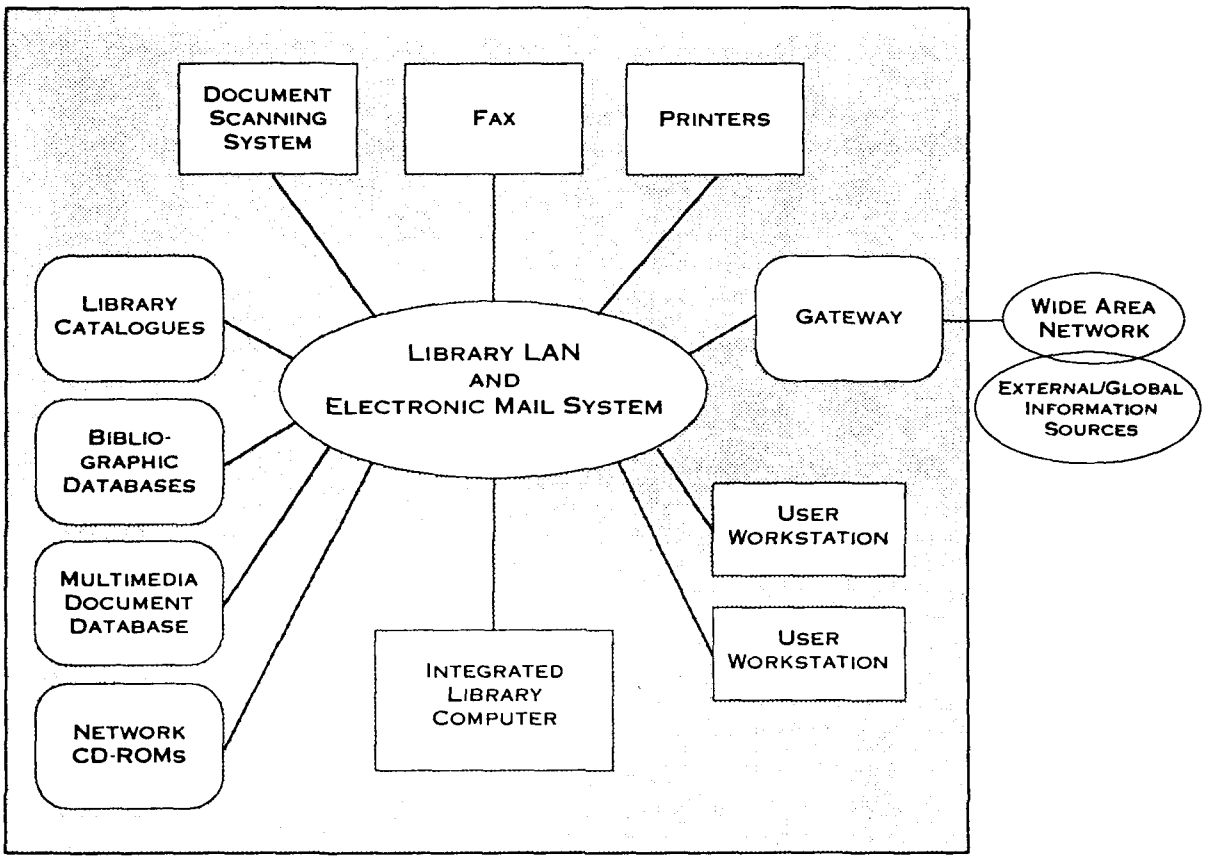


Figure 25. Sample Local Information View

JANET (Joint Academic Network). This network was created to provide a backbone network for academic and research institutions in the United Kingdom, and to provide access to public networks around the world.

If current trends hold, networks will play an even greater role in the provision of library/information center services. As soon as a substantial portion of your user community begins working regularly over the networks in your country, you need to get your library services connected. As current university students enter the scientific and technical workforce, the demand for networked information services will greatly increase.

TECHNOLOGY: THE HUMAN EFFECT

"Faced with the choice between changing one's mind and proving that there is no need to do so, almost everybody gets busy on the proof."

John Kenneth Galbraith

Implementing new technology involves change. Understanding and addressing this important concept – change management – is a critical component of any successful automation effort. Good communication and teamwork are essential during this time. You need to assure the staff who will be using the technology that this is a positive change for them. Key activities for reducing the staff's apprehension about any change and for easing the transition of "computer-phobic" staff to the new technology, as detailed below, include involving the staff in the acquisition and implementation processes, ensuring that the staff understand the process of change, conveying the benefits, reassuring the staff that you will be supporting them throughout the transition and keeping the staff aware of both initial and revised implementation plans.

Involving the Staff. The more you can involve staff in the process of acquiring and implementing new technology, the more they can be a part of the effort and the more they can feel ownership of your goals. In a time of change, the more you can keep your staff aware of your plan and its status, the fewer employee morale problems you will experience. You can involve your staff at several levels:

- ***Researcher***, a resource for helping to determine at the least the initial equipment selection.

  I was gratified to be able to answer promptly. I said I don't know.

  Mark Twain

- ***System Reviewer***, performing hands-on testing to make sure proposed configuration will work in your environment.

- ***Employee-selected Implementation Team Member***, providing input from a staff viewpoint and conveying information to fellow staff.

- ***Local System Administrator***, performing initial troubleshooting, providing training support and acting as primary contact to the System Administrator.

Ensuring that Staff Understand the Change Process. It is important for staff to be reminded that change - negative or positive - is always stressful and that it is always a process. The new technology will improve services to the clients and offer benefits to the staff, but the introductory stages, predictably, will have many stressful moments. These will abate as the implementation progresses. Mistakes will be made, but they should be viewed as part of the learning curve.

Conveying the Benefits and Responsibilities of Change. Implementation of new technology offers several benefits to staff: a reduction of routine work; more time for more complex, challenging tasks; increased productivity; new or enhanced technical skills and the opportunity to enhance professional expertise. Similarly, they, as information professionals, are key to making the library/information service more vital and more efficient. They must be prepared, ultimately, for the increased demand for services that results from increased productivity and efficiency. This increase in service can include not only larger volumes of work, but a requirement for a new or enhanced customer support function.

Communicating the Support to be Provided. Staff need to know what provisions are being made to help them transition to the

new technology. Who will be getting PCs or applications? Where they will be located? When they are expected to arrive? How will they learn to use them? These questions are critical, at some level, to every staff member. Staff also need to know that training will be provided so they will have the technical skills needed to perform their newly automated job functions. They need to know that you expect, not overnight experts, but a learning curve.

Keeping the Staff Aware. In addition to the mechanism of using staff as implementation team members, ensuring awareness of both initial and revised implementation plans can be accomplished in a number of ways. These include internal status newsletters, regular full-staff meetings or the transmittal of information through management and staff meetings and weekly or monthly status memorandums directed to all staff. Other ways of maintaining awareness and interest are holding "name that system" or poster contests, hanging posters in staff areas and creating an award system (whether monetary or a certificate) to recognize those individuals that contribute to the implementation activities.

Change management can not only help avert a slow and tortuous implementation; it can create an environment of excitement and anticipation for the new technology.

It is also important to give staff examples, such as the ones below, of the positive impact that technology introduction has had on library/information center jobs. They should know that other individuals have been introduced to new technology and survived.

- When shared cataloging over networks was introduced, some catalogers felt their jobs were threatened. In fact, their jobs were enriched by shared cataloging. The now highly accessible data enabled individual catalogers to work with existing data to create new catalog items; freed of routine work, they had more time for the more interesting work of creating items to be used by other catalogers and the opportunity to demonstrate their increased productivity.

- The introduction of CD-ROM made some reference librarians fearful that their job would be obsolete because patrons would be doing their own searching. In reality, the patrons tended to do their own "easy" searching but went to the reference librarians for complex, multi-source searching. Thus, the reference librarians were freed of routine searches; they had more time for more challenging work and experienced the satisfaction and rewards of increased efficiency.

Stress that these examples demonstrate how the introduction of new technology will increase the sophistication and quality of their professional work.

Technology is expected to eliminate positions in some cases. In fact, many library/information centers are funded to acquire new technology because a reduction in staff is being planned. If the staff reduction is expected to occur through attrition, explain that up front to reduce the staff's anxiety level. If you are in the unfortunate position of having to eliminate staff against their wishes, it would be wise not to use targeted staff on the technology implementation team.

The pure and simple truth is rarely pure and never simple.

Oscar Wilde

Prepare your staff for an increased workload as your new technology-supported services become successful. Better service will increase the demand for your new service - and for additional new services. In some ways, this can be a two-edged sword. Increased workloads mean increased management workloads; the library/information center managers must be prepared to set priorities and manage patron expectations. At the same time, both your organization and staff benefit from a properly managed increased workload. Efficiency and productivity ratings rise; your staff's professional expertise and morale are enhanced and they have access to new avenues of professional growth.

As you consider incorporating these change management techniques, remember: "Tell them what you're going to say, say it, summarize what you've said, and say it again!" This adult learning concept works well in an environment where staff are anxious about change. It works particularly well in an environment where rumors abound about the new technology implementation and staff fear rejection, replacement or loss of position.

MARKETING/USER AWARENESS

If we want to know what a business is, we have to start with its purpose. And its purpose must lie outside the business itself. In fact, it must lie in society since a business enterprise is an organ of society. There is one valid definition of business purpose: to create a customer.

Peter F. Drucker

Libraries and Information Centers are part of the "service" industry. Customers and usage are the reasons why information repositories are created and funded.

A very important part of introducing new technology into your library/information center is marketing the benefits, whether they be new services or improved services to the customers. Marketing, as defined by the American Marketing Association, is the "process of planning and executing the conception, pricing, promotion and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational objectives." Although many library/information centers are not involved in the "pricing" issue, all are involved in the conception and distribution of information services. If you don't promote your services to let your user community know of their existence, you run the risk that your services will not be used. Its hard to use something if you are not aware of it.

Even long-established information programs need to develop marketing/user awareness strategies to keep their customer base from eroding. For example, the NASA STI Program has been in existence for over 30 years. Last year a user survey was performed to identify what users needed from the Program. The goal was to utilize the results from this survey to develop a modernization plan for introducing new technology that would streamline information processing operations and provide new services.

Considering that the survey was only administered to NASA staff and NASA contractor staff, who are considered the NASA STI Program's "core" user population, the percentage of respondents who were "unaware" of the services or found out about the services from the questionnaire was very high. Figures 26 through 32 show the need for marketing/user awareness efforts in the NASA STI Program.

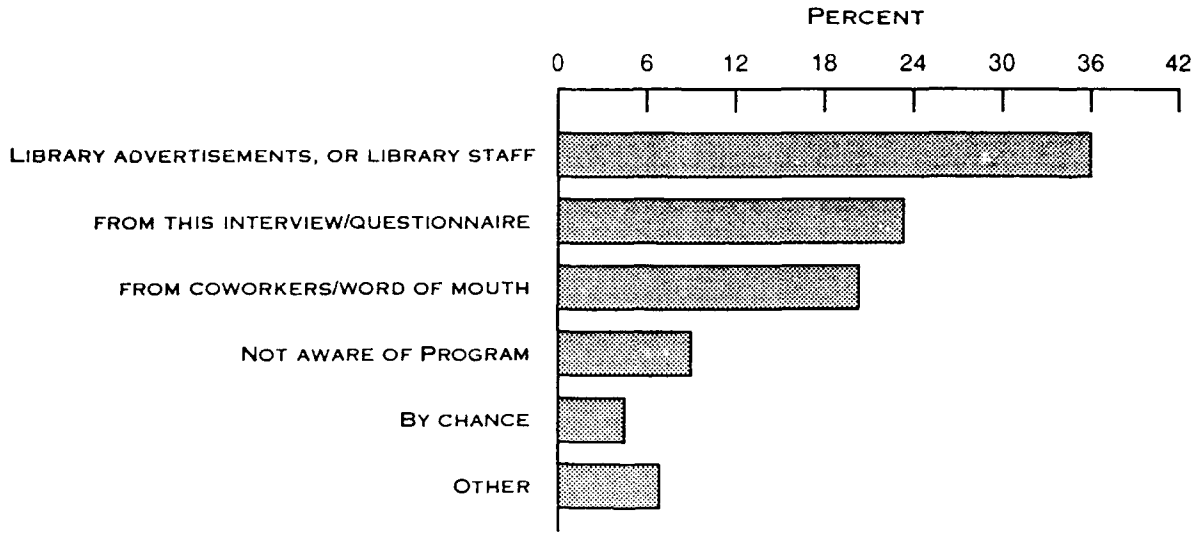


Figure 26. How Respondents Found Out About the STI Program

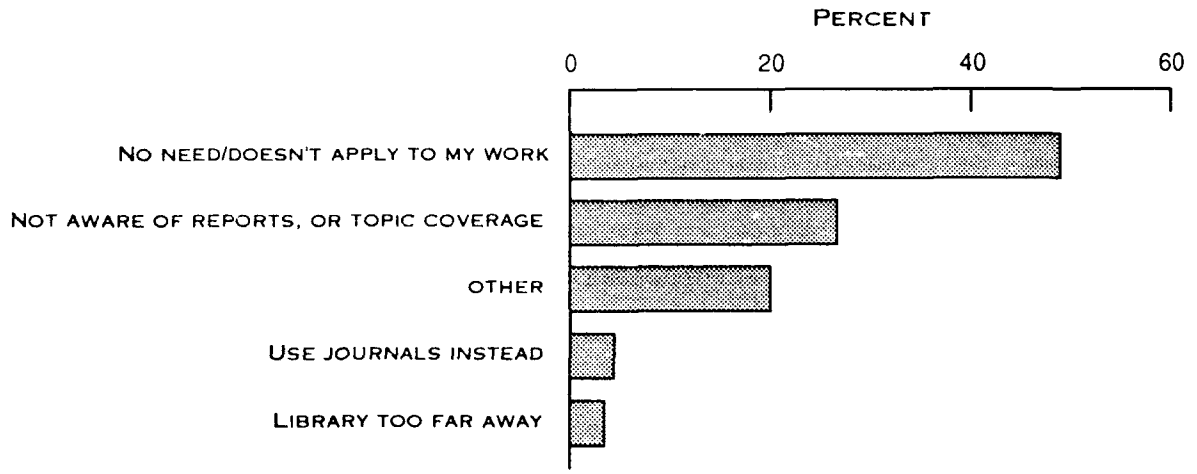


Figure 27. Reasons for Infrequent/Non-Use of NASA Research Reports

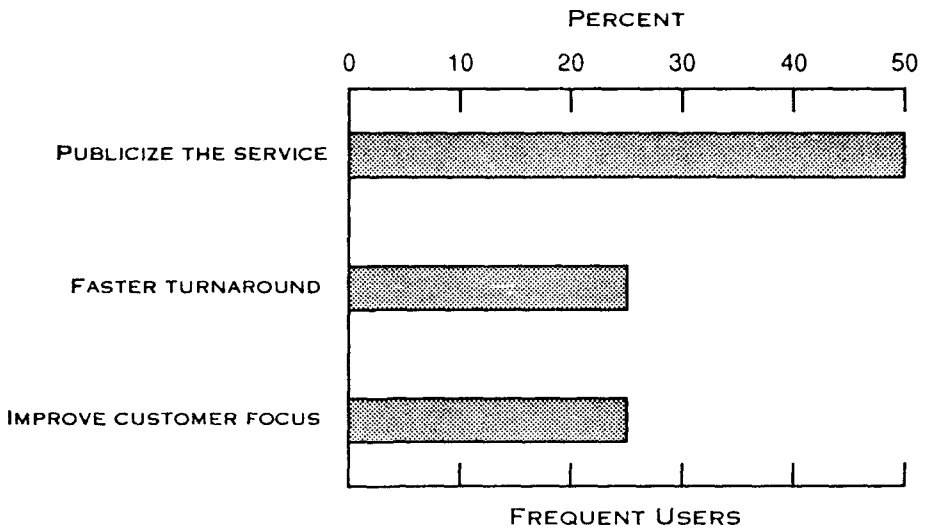


Figure 28. Suggestions for Improving STI Publications Assistance Services

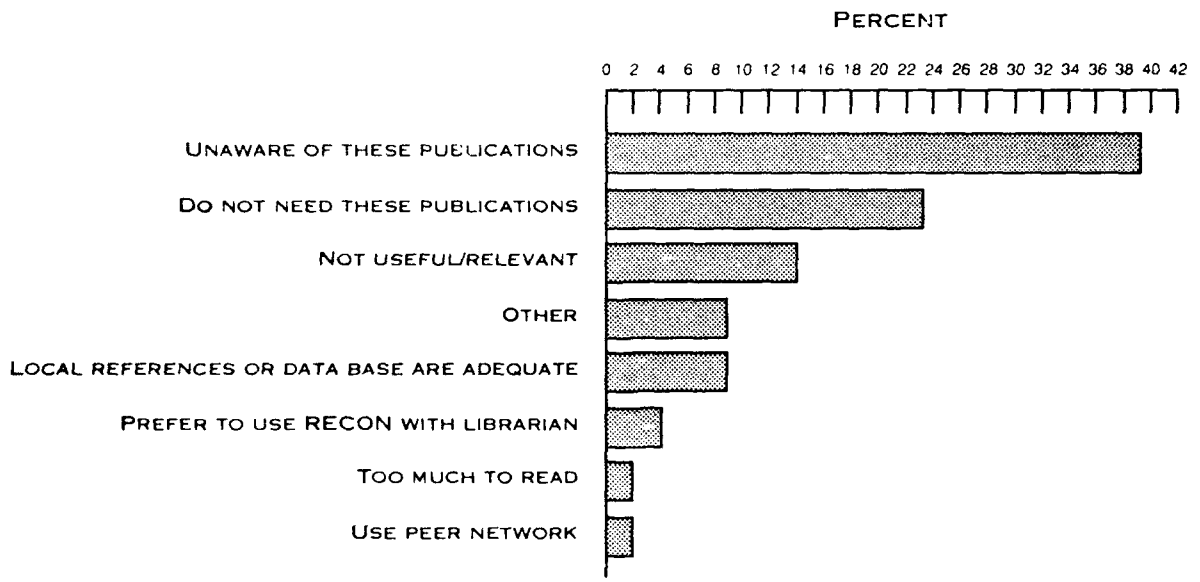


Figure 29. Reasons for Not Using NASA STI Subscription Publications

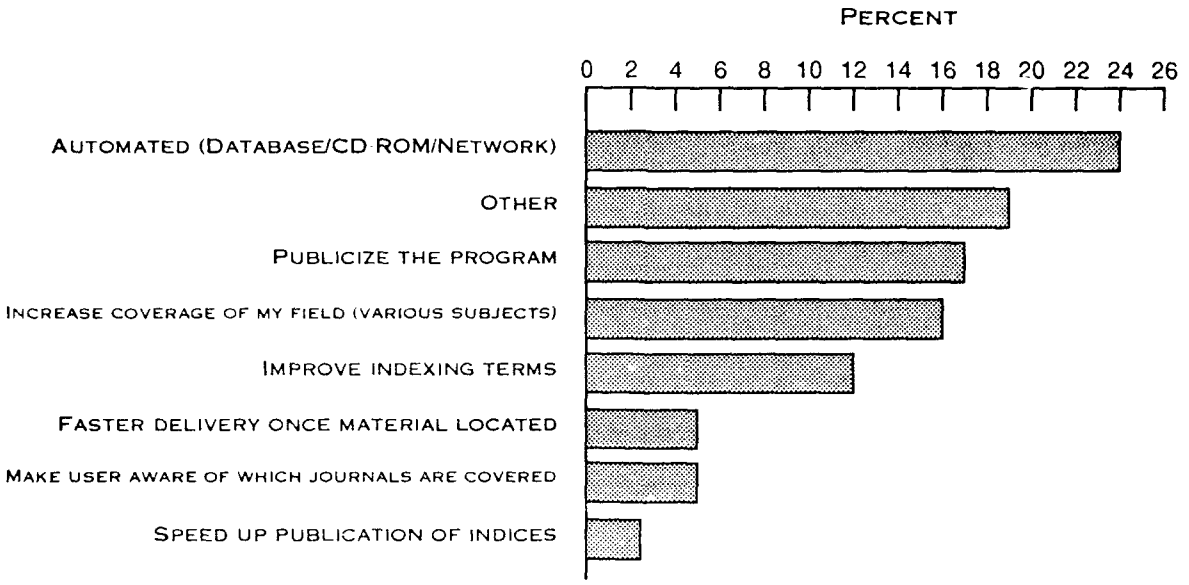


Figure 30. Sugestions for Improving Subscription Publications

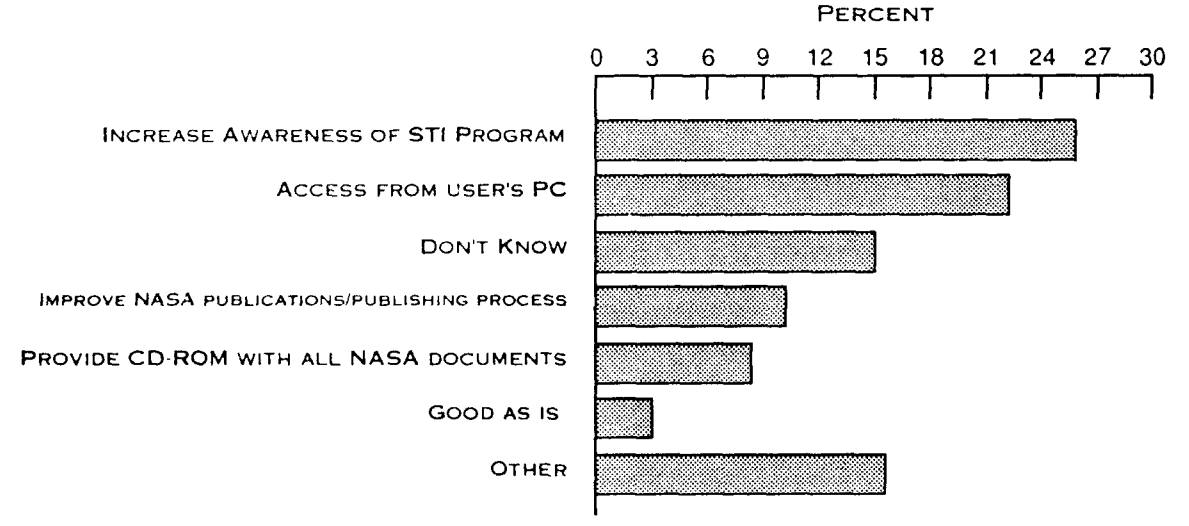


Figure 31. Desired New STI Products or Services

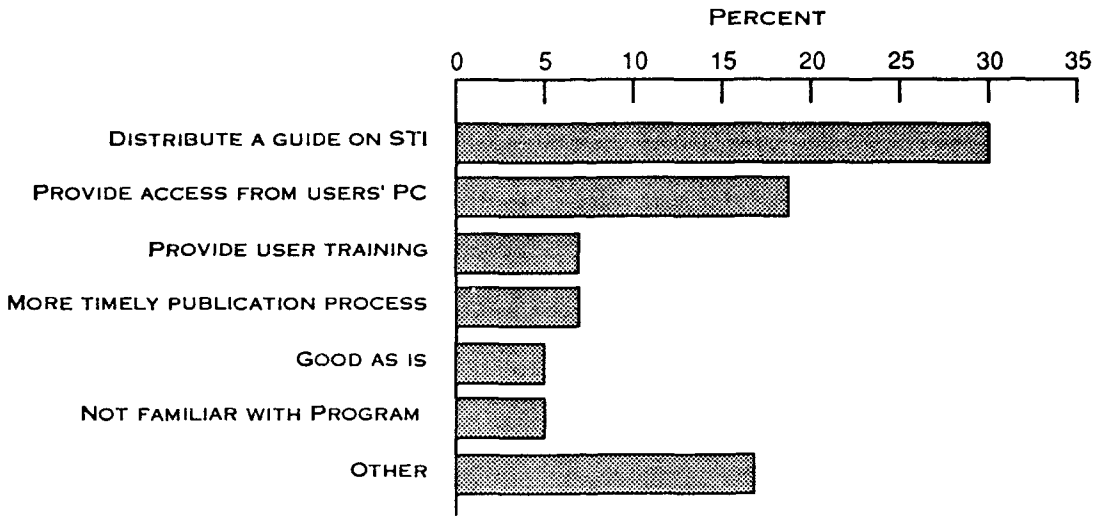


Figure 32. Suggestions for Improving the STI Program

For a library/information center, marketing involves:

- Identifying customer needs.
- Designing products and services that meet those needs.
- Communicating information about those products and services to current and potential users.
- Making the products or services available at times that meet customer's needs.
- Ensuring that those products or services are compatible which the customer's technological infrastructure.
- Providing the necessary "help" and follow-up to ensure the customer is satisfied.

Every one of these elements is essential to providing quality and valued information services to your customer base.

Marketing is a continuous process,but the life cycle of individual products and services (see Figure 33) changes over time. Your marketing strategy needs to recognize life cycle patterns. The focus of this paper is on applying technology to offer new or improved products and services. For these services you need to consider strategies for the "introduction" or "growth" stage of the life cycle. At the introductory stage you need to focus on stimulating demand and encouraging users to try the new product or service. Informative promotion is needed to tell potential customers about the advantages and uses of the new product. During the growth stage you need to shift your focus to cultivating selective demand for the product or service.

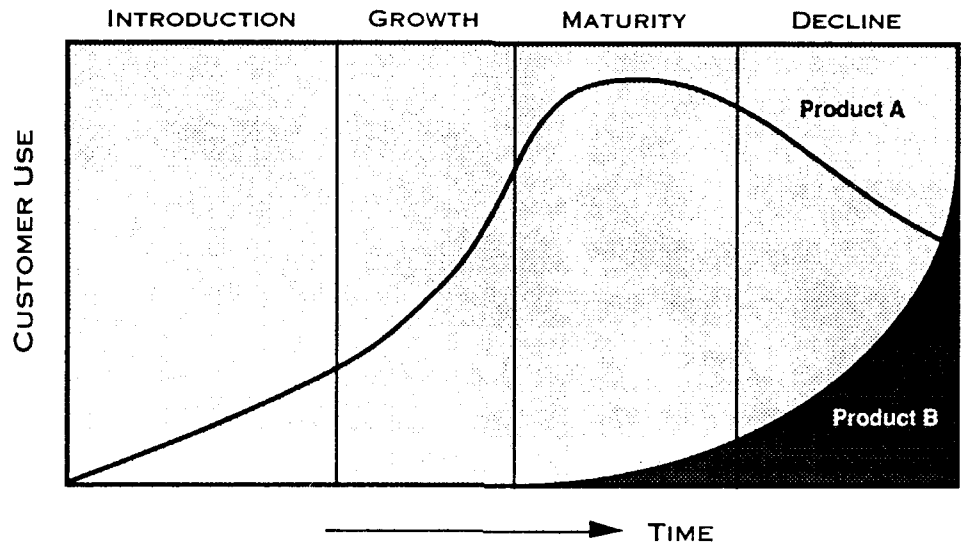


Figure 33. The Life Cycle of Two Products

Strategies that are used by library/information centers to promote user awareness of new or improved products and services include:

- Newsletters (including electronic).
- Brochures.
- Direct Mailings.
- Bulletins Boards (including electronic).
- Exhibits (with live demonstrations or descriptive material).
- Advertisements (in publications that reach a large portion of the target market).
- Personal Visits (only to the most critical u. ers).

When you develop a plan to introduce a new or enhanced product or service that uses new technology, you need to start your marketing effort before you have the final product. The products or services for which you use new technology to develop and bring to your customers - your new or enhanced products or services - are developed to satisfy user requirements. "Co-opt" users into the development and deployment process. Techniques you can use for doing this include:

Focus Groups. Establish groups of users who are interested in an aspect of your service. Have the focus group make recommendations and review plans for enhancing that service area. Users more readily endorse a service or product that they have helped create.

Beta Testing. Invite users to participate in a "beta" test of a new product or service you plan to deploy. Make it known to them that

this is a test version and their feedback is to be incorporated into the design for the final product.

Advisory Committees. Establish an Advisory Committee to oversee your modernization products and provide advice and guidance. The value of an Advisory Committee is be largely dependent on the ability of its members to thoughtfully assess your plans. It's success can depend on your committee selection process: make sure you select individuals with the necessary variety of skills in the committee.

The customer support side of marketing is vital to the success of a new product or service. Customers have questions when they are using something new. It is important that you establish mechanisms and channels, such as those listed below, for answering those questions.

Help Desk. The role of a help desk is to provide a point of contact for the customer. Knowledgeable and skilled personnel are required to staff a help desk. The staff do not need to know all the answers themselves, but they need to know where to get the answers and how to get the answers back to the customers quickly.

User Manuals. These should be easy to use and provide answers to users' basic questions about a new product. A staff point of contact should always be provided, even if a manual is provided. A good manual can greatly reduce the number of calls your staff member receives. The information requested of the staff can be used as input for updates of the manuals.

User Training. There are many different techniques that can be used, including classroom seminars and workshops, short demonstrations in the user's office or the library/information center and videos or computer-based training. Whatever mechanism you choose, you need to make sure it is well done and provides an effective use of the customer's time.

As a final note on marketing/user awareness, it is very important to find a means for measuring how successful your marketing strategies are at achieving your goals. Marketing efforts require an investment of resources, and you want to make sure that you see a return on that investment. Only by monitoring the results of your marketing campaigns will you know which strategies worked with your client base and how to adjust future efforts.

More than anytime in history, mankind faces a crossroads. One path leads to despair and utter hopelessness, the other to total extinction. Let us pray that we have the wisdom to choose correctly.

Woody Allen

THE FUTURE

Two key technologies will have a major impact on library/information centers of the future. One of these technologies is networking. Networks will continue to spread to all areas of the globe. Our library/information centers, offices, homes, classrooms, entertainment environments – virtually every aspect of our life will utilize networking technology in some form. All types of multimedia information, text, animation, audio, video and graphics will be networked. As this information becomes readily available over networks, the search and retrieval mechanisms necessary to

empower the ordinary information seeker will come to the marketplace.

The second key technology that will revolutionize the library/information center environment is workstation technology. Workstations will continue to become more powerful while prices continue to decrease, so they will be more widespread. But the workstation technology of future library/information services will support multimedia information. Not only will these workstations support color, motion, sound and text, but the information will be integrated and linked in useful ways. Many of the technologies diskussed in this paper, fax, electronic mail, online, CD-ROM, and electronic publishing will all be performed from a single, powerful workstation connected to a global network. This technology will be available in the home as well as in the office, promoting an increase in working at home or "telecommuting." For sure, users will "telecommute" to the library/information center.

As these two technologies move into the hands of users and library/information center technologists, the information business will be drastically changed. We will be at the age of the "library without walls" and the "electronic library." What does all of this portend for the library/information professional?

I posit that this profession will have more challenging work than at any other time in history. As the types and volume of information increase, information professionals will have the opportunity – and the requirement – to:

- Develop integrated, cohesive sources of information.
- Develop links between diverse sources of information.
- Recommend sources of accurate, timely information to users.
- Provide policy guidance on issues such as copyright and intellectual property.

Savvy utilization of information will provide organizations with a true competitive edge, and we will see Chief Information Officers (CIOs) become a reality in many organizations.

The future holds great promise and excitement for the information professional of tomorrow. But the real challenge faces the talented staff we find in today's environment who must lay the foundation and build the bridges to this exciting future.

Services: User Services In Defence And Aerospace Documentation Centres.

Chris Bigger
GEC Marconi Research Centre
Chelmsford
Essex
UK

1 INTRODUCTION

When the Library stock and layout have been considered the question of exploiting the collection arises. If money has been invested in stock, staff and equipment then maximum use must be obtained from them, otherwise the library is failing the parent organisation or funder. Full exploitation will produce useful returns on the money invested and further support for library services and future funding. Use of a library means matching users to information in the collection and various library services are available to achieve this. This paper aims to describe these services, highlighting the options, benefits and problems. In the space available the fullest descriptions are impossible, each service is a vast subject. It is hoped that the discussion presents a starting point for further investigation of each area.

Loans, interlibrary loans and circulation systems are discussed first followed by information services such as bulletins, enquiry services, online and current awareness.

2 LOANS TO USERS

The first and obvious choice is whether the library wishes or is able to loan stock. A very wide range of policies exist in the special library field, some libraries are willing to loan anything others will loan very little. The decision on loans will depend upon the nature of the organisation, the number of users, the size of the budget, security considerations and the aims of the library. This is a difficult path to tread, compromise is involved and you will probably never get it absolutely right. Categories of stock must be decided first.

Some stock will be easy to categorize there will always be reference works which should be in the library ready for instant use. Classified material may not be on open shelves and may not be available for loan without suitable security checks. Some very popular stock develops the ability to 'walk' and never be seen again, this should be confined to the reference collection for its' protection.

As knowledge of the collection and users grows the reference/loan split becomes easier to manage, the popular stock will be known and subject interests and behaviour of users will be familiar. Remember no decision is final! A reference book can quite easily be transferred to the loan collection if needed and vice versa. One reference copy and a few loan copies may work. The latest edition of a work could be the reference copy the older copy a loan version.

Sometimes an unfortunate library image is created, an old notion of the library staff doing their best to keep users away from stock at all costs, only grudgingly allowing material to be loaned! This image must be avoided at all costs. Remember you are trying to get stock used so the more that it is loaned then the more the potential use. If you receive a request for loan of a reference item do not blindly refuse the loan because the item is a reference copy. Is your policy correct? Should you move the item to loan stock? Use such instances as an opportunity to re-consider the division of your stock. You may receive requests to make the complete library reference only! The actual mix of stock will depend upon the organisation and its' geography, no definite rules can be offered, they must be developed locally.

2.1 Loan Period

Decide how long stock should be loaned, this is fundamental to the system and affects staff workload and budgets. Again there are no hard and fast rules in our field. The longer the loan period the less the book is available to other users so the decision is central. How large is the stock? Can duplicate copies be bought quickly and can the budget afford them? Look at the users - are the majority researchers, undergraduates, scientists, managers? Do you wish to place a limit on the number of books an individual can borrow at any time? Some libraries apply a limit, others do not bother. Some allow a weeks loan, others up to a month. It all depends upon staff levels in the library, do you have enough to carry out weekly overdue recalls? Some libraries do not impose a limit at all, they establish good relationships with users and make it known that the user can keep items as long as required, provided that items are returned instantly with no argument when the library asks.

If the loan period is very long, infinite or indefinite then much of the newer stock will be permanently on loan to one or a sequence of users. A user browsing through the library shelves can be forgiven for believing the library is antiquated with ancient stock. Suitable user education must be applied to counter this problem and it is therefore very important that a good catalogue is provided, automated or manual systems must show the true and actual stock held. A user consulting the catalogue will gain a true impression of stock rather than the inaccurate picture given by looking at whatever happens to be on the shelves. Browsing is a useful activity and should be encouraged but it is also very important that users are made aware that the catalogue will provide the true picture and will locate stock which may be on loan.

You may wish to develop a sliding scale of loan periods. For very heavily used items short term loans, as used in many academic libraries, may be needed. Multiple copies of stock are kept and they are loaned for a matter of hours with harsh penalties for late or non-return. Overnight or short term loans may be appropriate for some stock. From there you may progress to weekly, monthly or indefinite periods if required. All will depend upon the type of stock and how popular it is likely to be.

If you set definite limits to loans, remember you will have to carry out overdue recalls, if they are never sent users may abuse the system, but by sending them you are using staff time which you may not have. If you use indefinite loans there is the problem that the reader may leave, move office, lose the item or pass to a colleague. They may also begin to feel the book belongs to them. These problems can be countered by an annual or six monthly reminder

which does not recall the item but merely reminds the reader that you know they have it and to return it if it is no longer required. This should maintain adequate contact and with enough gentle persuasion users should learn not to abuse the system and that good behaviour benefits all users.

2.2 Loan System

Whether computerised or manual the system should track: the book loaned (author, title, shelf number etc.), borrower details, date loaned, date due for return, dates of overdues and any other special information. With some smaller special libraries it may not be economic to install a computerised loans system as the volume of loans may not be large enough to justify the expense. Any automated system has spin off benefits such as automatic overdues and statistics so the cost must be weighed against the size of stock and number of issues. Non-automated systems include multi-part forms, and loan cards on which borrower details are written. The loan system must be easy to operate and must provide means for running overdue systems and should make it easy to find where each item is at any time. The loan system should not keep the user waiting long at time of issue.

Some materials may require special treatment. Reports may have restricted access due to security and relevant need to know may be required. The nature of the need to know may be recorded in the loans system and there may be special handling methods to transfer documents from library to user. These records may need to be kept secure in themselves.

Standards may need special treatment. They may be loaned but may also be held permanently by users. Details of who has what must be kept so that amendments and withdrawl of standards can be notified to users to keep their collections up to date.

Separate record sequences may also be needed for short term loans, these must be run very strictly. If the library does not keep pressure on users to return quickly the system will cease to work.

Penalties for late or non-return are varied. Some libraries may charge fines for late return or charge for loss of items. Many others run no such system and rely on the close relationship developed with users to enforce good behaviour! Many libraries would have no wish to charge fines or the nature of their organisation would not allow it.

3 CIRCULATION SYSTEMS

Circulation systems apply mainly to periodicals. Large budgets are spent on journal holdings in most libraries. Because the most up to date and highly specialised information appears in journals, user interest is high. Journals must reach the user as quickly as possible.

All circulation systems are expensive in staff time and some decisions must be made once again involving compromise.

Firstly, decide whether you will circulate or not. Advantages of circulation are:

- Every reader gets a chance to see the full journal, including adverts and news items plus articles "on the edges" of the subject of interest.
- Users who are geographically distant to the library have equal access to the journal stock.

Disadvantages of circulation are:

- Circulating journals take a long time to complete their list of readers.
- Readers further down the list may see the journal months after issue. This is useless if you are trying (as every library should) to get information to users quickly.
- Users only see circulating journals and are not encouraged to visit the library to see journals. They do not get an opportunity to see journals not on their list and they do not make contact with other library stock and library staff.
- Valuable journals may get lost during their travels outside the library.
- If a particular issue is needed for consultation in the library it may be difficult to find where it is and to retrieve it quickly.
- Multiple copies of expensive journals may be needed to keep users waiting time down and perhaps to keep a reference copy in the library at all times. A wider range of journals could be purchased if money did not have to be spent on multiple copies.

If the decision is not to circulate then much staff time will be saved but users will be cut off from a very valuable source of information. They can visit the library but we are supposed to be saving the users time and getting the right information through quickly.

If the decision is to circulate then more staff time will be needed for administration. A list of names can be attached to each issue and sent on its way with instructions for each reader to pass on quickly to the next name on the list. This can work but relies on good behaviour and discipline from users, some of whom may be on holiday or away from the office causing instant delays to the system. Some libraries issue individually to each reader in turn, the journal returning to the library between each reader. This requires more library staff time but it means the journal is tracked better and can be accessed between readers and the chances of loss are less. Time is wasted as the journal travels back and forth from the library to user. Some libraries send to "gatekeepers" or key areas of the organisation. These areas feed information onwards. This may cut down numbers on lists. You must however identify the key areas and gatekeepers first.

Full circulation is probably impractical with the pressures of tight and decreasing budgets and the need to get information to users quickly.

The solution may be to consider contents page services. This way the journals remain in the library and are accessible at all times to users and library staff. Details of the contents of each issue of each journal are sent or circulated to users. It is most effective to send details to every interested user. Every user thus has equal access and everyone learns of journal contents at the same time, no one has to wait for the journal to reach them. Users can then visit the library to see items of interest or they may request photocopies. Contents pages will increase the amount of photocopying, pay attention as always to potential copyright problems.

Contents pages can be generated by photocopying index pages themselves and sending these to users. Some journals index pages are printed on colours which do not copy well and some do not have index pages at all. Others are not very informative with obscure article titles. News items may not be indexed so the user may miss useful pieces of information. In all these cases an exception may have to be made by circulating the actual journal. Be aware again of copyright problems if you are photocopying contents pages.

If staff resources are available then journal contents can be entered into a contents bulletin or tailored individual lists with abstracts, the reformatting avoids copyright troubles. Tailored listings do allow emphasis to be placed on items of particular interest to the organisation.

Contents pages provide fast and equal access and maximise use of journals and budget because multiple copies are not needed. There will always be some titles which must be circulated as originals. Titles with many news items or uninformative index pages for instance. Be strict with all others or a full circulation system will gradually appear.

Some journal publishers are now producing their own contents guides, often free of charge. These should not be seen as a substitute for local systems but they may have a use. They often appear before the journal itself. This information may also be available electronically, tailored to your local needs. Download this to your local system and consider distributing to users electronically. This may be a developing trend over the next few years but remember it is very unlikely ever to cover all your journal titles.

There are also contents journals available such as the "Current Contents" series which list journals in various subject areas. This may save local effort but it will cost money and there will be delay between the publication of the journal and the appearance of the contents journal. Such titles may be of interest for titles which you cannot afford to purchase regularly or for titles on the edges of the library coverage. Users can keep up to date this way even though the library may not hold the title, articles can be requested form other libraries or if the title becomes very popular this is a useful way of assessing potential journal purchases.

If the library handles reports there may be requirements for circulation of new reports from the parent organisation or external sources. There is no option but to circulate the actual copies themselves but multiple or individual copies may be available at low or zero cost. Reports alerting bulletins are another method which would alert users to new reports material. Appropriate measures must be applied to allow for government or commercial security.

There are may choices all dependent upon staff and budgets available, remember that journal literature is important and aim for information being with the user as quickly as possible. Some compromise may be necessary and may upset some users but be firm and an efficient system will result.

4 INTER LIBRARY LOANS

An important service which users must be aware of and be able to access with ease. There is often an assumption that if an item of interest is not in library stock then that is the end of the search. Users are often amazed at the extent of back-up available from other libraries. No library can hold everything and knowledge of back-up services and where to go for what information is an important part of any library service. The following are examples of inter library lending:

- Membership/payment for use of a National Library.
- Membership of a professional society library or a subscription library.
- Occasional use of libraries on the understanding that postage and packing will be paid.
- Use of libraries on a reciprocal basis, where two co-operating libraries help one another with the understanding that the mutual help is seen as equal between the two hence there is no need for charges.

Knowledge of the coverage of different external libraries will grow with experience, many will specialise and each will have its own procedures and variations in speed of supply. Particular types of request will be routed to particular types of library.

Before applying for an inter-library loan it is important that local stock has been checked and double checked. A major factor in all inter library loan work is the importance of accuracy. Wherever the request is being sent it is vital that the fullest information is given on the request form. Inaccurate or incomplete work may involve much work by the receiving library or rejection and failure of the request. Bibliographic checking must be done before sending out the request, details must be correct and care must be taken when filling in request forms to avoid transcription errors.

The National Library or subscription libraries will probably use request forms which you may be charged for and may have to be prepaid. This adds to costs and must be budgeted for, the better the local stock, the less inter library loans will be needed, so with outgoing requests for items requested frequently, it may be cheaper for the local library to purchase rather than make multiple requests for the same item from other libraries.

Users must be kept informed of progress at all times, the urgency of the request must be established when the user first makes contact, if very urgent it may be worth paying for premium services or express delivery. Some procedures can be very slow and it is easy for the user to feel forgotten so keep them informed of progress. If an unexpected delay occurs it is doubly important to tell the user as the extra delay may make the document arrive too late to be of use. The request may need cancelling in this case.

Some interloan material may be classified, the need to know will have to be quoted by the user and when the document arrives suitable handling precautions must be used to make sure the document goes only where intended.

With any type of material the loaning library may impose conditions on the loan. If the item is expensive or rare then the user may not be allowed to remove it from the library. These limitations must be explained fully to the user and must be observed otherwise future loans may not be allowed.

Great care must be taken of all interloan material as damage would affect attitudes to future service, as would late return, no postage paid when demanded etc. Interloan files should be checked frequently to make sure nothing is overdue and requests are running smoothly, the files

should be kept separate from other files, this makes sure external material is well cared for and does not become confused with local stock records.

Items returned by post must be well packed and postage paid, if you are able to check posting dates then do so, this may be useful if anything is lost in the post.

At all times try to make matters as easy as possible for the loaning library, by doing this you will ensure good service in the future.

By running an efficient interlibrary loan system users can be given a wider range of stock, expanding their horizons worldwide if necessary and allowing them to obtain any items which searches or other library services produce.

5 ACCESS TO STOCK

Many services depend upon fast and accurate access to library stock. The user needs to know if the library holds an item, if it does then where can it be found? Which area of the library holds the item and on which shelf can it be found? If it is on loan it should be easy to reserve a copy.

As technology moves forward into greater specialisations then user interests and enquiries move to narrower subject fields. Publications match this trend with titles becoming more specialised. This means that user enquiries are becoming more specific and more demanding of retrieval systems and staff.

Access to stock demands catalogues for users to consult which will work quickly. A card catalogue and manual classification scheme will provide access via author, title and subject. The subject sequence should be as detailed as possible. All sequences point to the classification scheme which provides a subject arrangement for the stock and a location on the shelf.

Computerised catalogues or library databases are important and popular because they give many more access points to each document and allow output in many formats. OPACS (Online Public Access Catalogues) allow an inexperienced user to search the computer catalogue, suitable menus and help systems guide the user through the search to locate documents. It is very important that suitable trained library and information staff are always available to users for general assistance in locating stock, subjects, processing loans and advising on further research and which departments to speak to in the library. If OPACS or computer access is available a staff presence is still essential. Even though users may have access to computer systems there is no guarantee that they will find the required information. Guidance may be needed on how to formulate a search enquiry or how to think about information problems. The user may find no information at all or may find large amounts of irrelevant data and may not know how to proceed further.

If the library catalogue is available electronically outside the library these problems still occur and users must be encouraged by the system or by other publicity to contact library staff if they do not find what they require. Remember also that the users perception of what they require may be coloured by a false view of what information can do, their expectations may be set very low and suitable help from an intermediary may raise expectations and supply information at a level never imagined by the user!

6 ENQUIRY SERVICES

An enquiry service is an essential part of the information centre. With this service the stock is exploited to the maximum and users time is saved.

The range of enquiries received by any information centre is very wide, the enquirer may need an address of a company, may wish to check the spelling of a word, may need some review articles to make a start on a new subject or may require access to as many documents as possible for an exhaustive search covering many years. The possibilities are endless.

The library and staff must be able to respond to these demands quickly, remembering that the main aims are to save the users time and to prevent duplication of research.

The first essential, no matter how simple or complex the enquiry, is to establish user requirements exactly. Enquiries are often worded in very broad, general terms. The information staff must be aware of this and must not necessarily respond to the first specification of the enquiry. Discussion between enquirer and searcher must take place, to narrow down the exact nature of the enquiry and to get a full description of the problem.

Quick reference enquiries which can usually be answered in a few minutes may not need lengthy discussion. They can often be answered from the library reference book collection. The reference collection should contain the standard reference works - dictionaries, directories, technical handbooks, and standard works or reference works in the library's field of work. Comparing notes with other libraries in similar fields will help suggest titles and contents of a reference collection.

When more complex enquiries are being dealt with then longer discussion will be needed. Time spent in discussion is crucial and is not wasted, the more discussion the better the search result. A good knowledge of the subject can help the searcher to understand the enquirer and many organisations insist on relevant subject knowledge or qualifications for their information workers, this will cost more of course. Subject knowledge at the relevant level can be acquired by experience but it is the thorough knowledge of stock and the ability to talk to users which are the important skills. Nobody will understand the finer points of every enquiry encountered and we cannot know everything about our complete library stock. The ability to select the key features of an enquiry and translate them into a search statement is the major skill. If the enquiry seems obscure or you do not understand it then ask the enquirer to explain it again until you have some grasp of the content. Do not pretend to understand the problem when you do not, this way a very poor search is likely to result with irrelevant documents and the user may never return! In addition to the subject of the search you must establish any other limitations or requirements such as how many years must the search cover? Is the nationality or language of the output important? Are there any time constraints imposed on the enquirer?

Once a suitable description of the search has been completed then the search may be carried out using in house or external sources, In house sources will include the reference book collection, the library catalogue, any other in house databases and any abstracting or indexing services held in hard copy. CDROM services held in house will also be useful at this point.

Online services are the major external service and they provide fast, in depth searching. They may cost money however and this may be a barrier to the user if costs are recovered by the library, work may have to be done to convince the user of the cost/benefit of online systems. If needed, time should also be spent explaining the nature of online and the types of output available.

Communication with the user is vital later in the process. If there are delays, let the user know. Inform fully of any limitations in the search based on your experience. Comment on how up to date the sources used were, which of the authors quoted are seen as lightweight and which are authoritative. What is the subject coverage of the database searched? Did the search catch the "edges" of the database subject coverage? Do you as the searcher believe you have covered the subject fully?

Once the search is complete you must consider how to present the information. Obviously for quick reference enquiries this does not apply. Most online systems present references in reverse date order. If this is unacceptable you must re arrange, author order is popular or you may wish to divide by subject aspects. Will you provide original documents or a list of references? Sources must always be quoted even for the most simple enquiry, this gives authority to the results.

Some sophisticated information services spend time analysing the information found, perhaps writing abstracts of the documents or producing technology summaries after reading the retrieved items. This is advanced work and does demand a high level of detailed subject knowledge.

Once the information has been delivered this is not the end of the enquiry, the user must be encouraged to feedback opinions on the usefulness or otherwise of the search results. The first set of results may refine the users requirements or set off further lines of research. The feedback approach will allow further searches to be discussed and will help strengthen links between user and information centre.

Some searchers find it useful to keep records of searches completed, this can help with future work particularly if a search was complicated or the source was obscure. Subject indexing these records can provide a useful everyday aid but it takes time to maintain. An index of useful contacts and addresses is an essential aid, it does not have to be sophisticated, a notebook will suffice and it will be of great assistance.

7 OUTSIDE CONTACTS

The search may find very little information, or the subject requested by the user may be completely outside the subject coverage and expertise of the library. Whilst online services can certainly help with unfamiliar subjects, it may be necessary to contact other organisations for help. This may be on a fee paying, free or "friendly" basis.

The information centre therefore becomes a referral centre, routing enquiries to other bodies. This is a valuable service and it should not be under valued, users should most certainly be made aware of it.

Numerous directories are available which list organisations and index their interests. You should be able to find relevant organisations, place your enquiry and get useful results. There may be charges for the service so check any costs before proceeding. Most library and information workers are helpful people and will do their utmost to help even if only to point out useful sources or other people to contact.

The "friendly" contacts are also invaluable, many libraries or individuals establish close contact with others with similar interests, Information or advice is given free with the understanding that the favour will be returned when needed. Many libraries exchange information this way, even between competitors because no one will ask for or give anything of commercial or defence significance. It is not a back door to information it is a means of co-operation for mutual benefit.

The potential networks available are massive and users should be encouraged to see the library as a referral centre if necessary.

8 ONLINE AND CDROM

The online revolution has brought great changes to our work by offering the user faster searches conducted in great depth on a very wide range of subjects. CDROM development has built upon the online revolution.

If an enquiry service is provided then online searching must be provided and CDROM will become essential as more data becomes available on optical media.

As mentioned earlier it does not matter which search medium is used, the most important work is to find out exactly what the user is looking for. Once this is established the sources for the search can be selected. There is no rule which says that the answer to all queries will be in online systems, the information may be available just as easily or easier in printed sources for instance. There can be an unfortunate tendency for information workers to automatically think of online for any search, this attitude must be avoided at all costs, online is just one of many tools at our disposal. Online is faster and can give access to abstracts or data which the library cannot afford to buy in hard copy. Costs will be incurred for online use and if these are charged to the user then some explanation is in order. The user does not need a detailed description on how to search but enough should be explained to show the basic features, costs and what you will be doing online.

Online systems first appeared as a solution to the printed information explosion. As more databases appear we now have a database explosion to the extent that it is often difficult to select the correct database for the search. Relevant printed guides to online systems should be available, information from database hosts on their collections of sources will help, many services now have online systems to help the selection of database and crossfile searching can be a great time saving aid. Training must be given to staff running online searches both introductory and advanced techniques must be available. It is vital that online searchers keep right up to date on all developments concerning new databases, hosts, record amendments, update times, search language changes or enhancements and anything of relevance to the online world.

Output from the online search can be tailored to local requirements and sorted into various sequences. The user may be happy to receive the data in printed form but increasingly users are demanding other forms of output. Many libraries now use PCs to search online with downloading data onto disk. This data is then re-processed, perhaps by word processor to dispose of unwanted text or to re-arrange layouts. The search can then be printed or given to the user on disk or sent via

electronic mail. The user can then use the data as required, to re-format or incorporate in other documents. Copyright problems should be investigated and if the data is to be kept in electronic form some database hosts may demand additional fees for data downloaded and stored. Even with printed output there may be problems if multiple copies are taken, check if you are unsure.

Software is also available to help the downloading process, allowing information to be re-formatted, rearranged or placed into local databases ready for later retrieval (check copyright again).

The most effective search is achieved when the enquirer is present while the searcher works the online system. Reactions to the search can be heard immediately and the interactive nature of online can be used to modify the search as appropriate and tailor the results. End user searching is also allowed in some organisations. The user conducts the search him/her self. Front-ends are available which provide menu driven guides to formulate a search, connect to the host, complete the search and present the results. Many online systems have menus available which allow simple searches. End-user searching allows the enquirer direct access to the system and information, it is important that suitable guidance, backup and training is provided otherwise some poor results will appear.

If end-user searching is seen as a starting point with simple searches done by the user and more complex searches referred to the information worker then training and education must be given to the user to point out the limitations, benefits and techniques of searching. Encouragement must be given to contact information people in the event of any problem or an unsuccessful search. If this is not done then we run the risk of alienating users completely, they may never return if a search they have done themselves produces no relevant results and they are given no directions on where to go next. A friendly information person nearby would be able to provide gentle advice on search formulation, whether an online search was appropriate, hosts to use, databases to use and hard copy stock which may have the answer.

If users move to the next stage and become more expert then the information department may change role from carrying out searches to being an advisory centre advising on online sources, search techniques and problem solving. This removes the simpler searches from the information centre. Costs can increase dramatically if unskilled users are allowed online, make sure budgets can cover it or find alternative methods.

CDROM systems are now well established in the library world and are now essential tools. Very many sources of information are available on CDROM from reference books to databases. Reference data on CD will provide interactive searching and in some cases will give much greater depth of indexing. For instance the Janes' Group defence directories are not very well indexed in hard copy but on CD the indexing is very detailed and more complex searches can be devised.

Databases on CDROM can help control searching costs since the cost of a CDROM database may be quite high but it is a fixed cost which does not vary according to amount of use. Library staff and end-users can make unlimited use of the database for a fixed cost. Most CDROM systems have reasonable user interfaces designed for unskilled users so end users should be able to benefit as well as information staff. Make sure again that adequate training is given to end users who are using CDROM. The same dangers lurk with CD as with online. The user may be unskilled in formulating search statements and there will be an expectation that the data required is bound to be in the system whereas it may be in a book on the shelves or in a different database. Always make sure that the user is guided either by the subtle presence of a member of staff or by menus or instructions by the PC giving alternative sources and what to do in the event of failure of the search. They may need guiding towards a database for a search in greater depth. Make sure that the searching staff are aware of the limitations of CDROM in terms of currency (the online service may be updated more frequently), coverage (online may go back a greater number of years) and search language (the online service will have more sophisticated systems for retrieval).

The enquiry service is a central feature of any information service, if it is well publicised, well staffed, suitable resourced, well used and feedback is encouraged, then your organisation will receive value for money.

9 CURRENT AWARENESS SERVICES

Current awareness services and Selective Dissemination Of Information (SDI) are two methods to keep users up to date.

Both systems involve the information unit sending notifications to users about items of interest to their work. The items will have been selected by information staff who scan the literature. These services help to save the users time, keep them up to date and save the need for the user to read through mountains of publications.

The first type of service to consider is the bulletin which is normally used as a general awareness tool to keep a wide range of users up to date. Bulletins are produced in a variety of formats and types of coverage and it is not unusual for an information unit to produce several.

The most basic bulletin is the Accessions bulletin which is simply a list or recent additions to library stock. The bulletin may be an exhaustive list which includes everything added or it may be selective in some way. Issue frequency must be decided by weighing the amount of material coming into stock with the staff available and the urgency of the need to keep users up to date. Subject arrangement and some form of indexing may be needed if the bulletin is large. Automated library systems should be able to produce various listings with ease. Decide whether you need abstracts of each item, can you afford to write your own or should you use the authors' original abstract? You may also need to consider separate bulletins for different stock types as treatment may be different. A Defence Documentation Centre may produce a detailed list with abstracts of all reports added each month. There may be different bulletins with different levels of classification available to users according to their need to know An industrial library may produce a list of new books and a separate bulletin listing newly issued company reports. Numerous combinations are possible, the amount of detail will depend upon staff available and the availability of computer aids. Remember you are saving users time by removing the need for them to visit the library to keep up to date on new additions. Also if users are geographically distant or spread out over many sites then a bulletin is an excellent means of keeping them up to date and in touch with the library.

A more general bulletin is the next stage of development where articles from journals and conference proceedings are included in a printed bulletin. A combination of local stock accessions plus selected articles from the literature may be used, or perhaps the two stock types may be seen as separate and published separately. Both types are in use in numerous libraries.

If you are compiling the slightly more complex bulletin then articles must be selected from the current intake of stock. This requires some detailed thought and editing to make sure a reasonable number of items will be of interest to users. These selected items may than be entered into a local database or placed on cards ready for typing. Abstracts may need to be written locally. Consider carefully the local work involved and the coverage and content of online systems and CDROMS. The items you are selecting and placing in the local bulletin may be well covered by the online supplier, selecting and abstracting these items again could be seen as a waste of time. Look at the possibility of using the online system to compile your bulletin, remember to speak to the supplier to check copyright agreements and special payments. You may find that the local system still has the benefit that locally written abstracts are tailored to the local users and many sources scanned locally may not be covered at all by the databases.

The choice of general library bulletin is awkward, compare notes with other libraries, speak to users, run trial issues and be prepared to re-design any publication in response to user suggestions. Subject interests change as time passes and the literature also evolves, it may be necessary to consider re-designing the bulletin from time to time to reflect these changes by revising subject headings for instance.

Most users receive large amounts of paperwork in which the library bulletin may get lost, so consider the use of striking designs or strident colours to distinguish the bulletin(s) from the rest of the paperwork. When bulletins have been running for some time users will then associate the colour with the bulletin.

Make sure there are instructions in the bulletin on how to see items of interest. Request forms can be included in the bulletin and users should be encouraged to visit the library or telephone if they do not use the forms. The bulletin can also be used as a publicity tool with a regular page on news and items of interest about the library, at all times users should be encouraged to use the library and feedback opinions. The bulletin may be the only contact with the library for some users so make use of the opportunity to publicise. Pay attention to the list of recipients for the bulletin and revise it from time to time. Send notes to users occasionally asking if the bulletin is still of interest and asking for new names for addition to the list. Some copies will almost certainly have multiple readers, make sure they do all manage to see it and suggest more copies if they don't.

Monitor the number of issues of the bulletin. Keep statistics on the number of items included in each issue and which subject headings they appeared under. Count the numbers of requests for each item listed in the bulletin. These statistics will allow you to gauge the effectiveness of the bulletins and re-design where necessary but do remember to ask user opinion too.

Bulletins function as general awareness tools and they should not be seen as the answer to all problems. They scratch the surface of a subject or indicate some of the relevant recent documents which should be of interest to a reasonable number of people in the organisation. They cover new or current information and may not reflect the true nature of a subject which includes older publications.

For more detailed coverage of narrow subject areas it may be economical to produce a range of different subject bulletins. An effective method is to move to individually tailored awareness services of Selective Dissemination of Information (SDI). With SDI the individual user is matched to individual documents, it is a labour intensive activity but it is an area where the information service can really show it's value.

First of all you must find out about users needs. This may be done in any case for other areas of library work but you must find out everything possible about individuals work and group activities. This can be done by personal interview at regular intervals, attending technical progress/marketing meetings, watching reports issued from departments, noting literature searches and reading any progress or annual reports from departments. The register of user interests may be kept on card indexes by subject or kept in a database. Such a database becomes a useful tool not only for checking user profiles but also as a register of experts on subjects. It can therefore be used as an expert finder if designed correctly.

The register of user interests must be kept up to date and users must be encouraged to update their profiles at any time and to feedback opinion on the usefulness or otherwise of items received.

All incoming material is scanned for relevant material. Stock may be split by subject and dealt with by staff with subject specialisations.

When relevant material is found the user is notified, by telephone, by a short note or by sending a photocopy of the first page of the item (check copyright if this is proposed). The user may then decide upon the relevance of the document and visit the library to see it or request a copy. This is a very labour intensive activity if it is to be done properly so some form of automation may be worth considering. With an in house system user profiles can be stored on the system and matched to incoming items providing individual outputs. Some information centres input journal articles for compiling a bulletin. Running an SDI service from this is possible but for maximum effect with an automated system, consider the online services. The numerous online hosts cover and abstract most subject fields thoroughly. You will probably find an online system somewhere which covers your field and it will probably abstract and index in much greater depth and detail and cover a wider range of stock than could be achieved locally. You would have difficulty matching the online services. Only when you move to specialised fields or more obscure stock would it be worth entering every journal article locally.

The online systems provide a number of methods for keeping up to date. Usually the search is created online and tested for effectiveness, it is then saved long term. Depending upon how the search is saved (exact technique varies between hosts) it can be re-run when required. You can arrange for the search to run only when you connect to the database and ask for it to be run. Alternatively the profile can be run whenever the database is updated or at particular intervals. In all cases the print out can be

delivered to you as hard copy or downloaded into your local system for distribution. Electronic local distribution would be possible from there. The online systems can produce very good SDI results but remember they will cover journals not held in local stock which may drive up interlibrary loan costs and they cost money, costs vary according to items retrieved.

Current awareness and SDI are examples of the library going out to users with detailed, accurately targeted information which keeps them up to date and maintains close contact with the library and information service. A very important service which any specialised library must consider as essential features.

10 CONCLUSION

An overview of important services has been provided. It is not possible in the space available to provide in depth coverage, but the information provided should give a foundation on which to build further study towards effective services for users. Remember that contact with users is vital and at any stage other libraries can provide useful comparisons, information and ideas. Library services exploit the library stock and provide a route for contact between user and stock, a full range will make sure the library and information centre is well used, making maximum use of the funds invested and thereby surviving to provide services in the future.

SECURITY CONSIDERATIONS WITHIN MILITARY INFORMATION SYSTEMS

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1. SUMMARY

Military information systems, as well as systems operating in a governmental environment, will administer classified information as well as documents, which are not to be released to the public. Such information needs reliable protection against unintentional disclosure and unauthorized access. The paper advises on the principles of a security risk analysis and outlines methods for adequate handling of sensitive information, considering especially objectives, requirements, and functions of network security.

2. INFORMATION WORK AND SECURITY

The objective of every information system is to provide the necessary information to its users as complete, accurate, and timely as possible. To meet this objective, relevant information must be identified, procured, processed, and stored in the system. It must be retrieved reliably, and it must be transferred to the user quickly. Therefore, system managers tend to concentrate on the two main areas of information work: input and output.

One other aspect of information work, especially in a government environment, relates to security of the entrusted documents and data. Security actually superimposes the various steps of information management. Security regulations have to be observed starting from the moment, when a document which requires special handling is handed over to the information system. And the responsibilities of the system management for such documents do not necessarily end with the delivery of the information to the user.

So an information system, which keeps sensitive documents in its holdings, has to cope with the following contradiction: The information specialist is vitally interested to disseminate all available information to the system users, whilst the system security officer is convinced to have good reasons to protect at least some of this information from transmission. Management, therefore, must find ways to ensure comprehensive information of its authorized users, but at the same time shield sensitive information against unauthorized access, inadvertent disclosure, and misuse.

To provoke the appropriate attitude towards data protection and document security, especially within a military information system, it will be necessary to consider the type of data and documents which require protection, possible areas for security risks and violations, and preventive arrangements and precautions against security attacks.

Modern information systems rely extensively on electronic data processing and transmission. Obviously, all questions related to security in this special area of information management are of utmost interest and importance, and therefore have to be considered seperately. So we have a number of areas which need to be discussed. Figure 1 illustrates these problem areas.

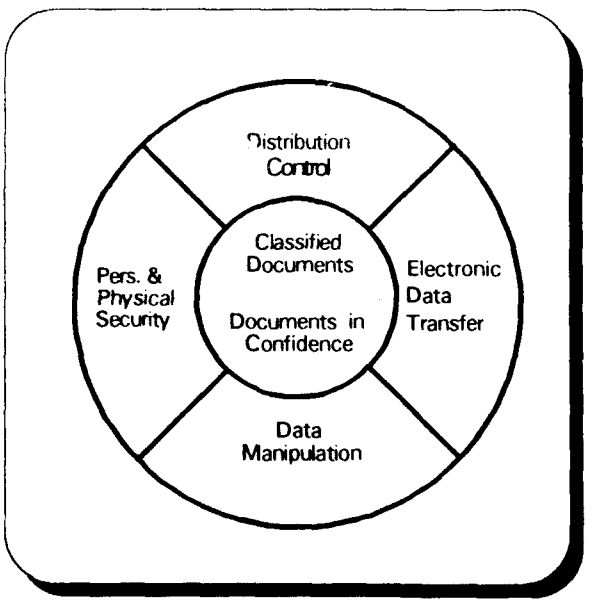

Figure 1

3. SENSITIVE DOCUMENTS AND DATA

It seems to be reasonable to begin this survey by looking at the type of documents and data collections which will be accumulated in a typical military information system, and which require certain protection. Such a system will normally operate a referral type data base, which contains references to the documents held in the document collection. These two, the database and the document collection, constitute the prime security challenges, and therefore will be of main concern in this paper. Needless to say that, in addition hereto, there will be data collections of various types, for example collections of factual data, files on users and their information requirements, statistics on the subject fields related to the systems documents, information relating to ongoing research, and many more. Many of these sensitive data require special handling procedures, and need proper protection as well. Their safeguarding, however, is simplified by the fact that they are normally prepared for the system management only, therefore being kept internally and not being available for the users.

3.1 Classified Documents

Military information systems are most likely to hold documents which fall under NATO or national security regulations. These "classified documents" (or classified data, if we also consider classified references to such documents in a database) contain sensitive information. The unauthorized disclosure of this information would result in serious damage to the originating country or to NATO, as the case may be, or at least would be undesirable to its interests.

A classified document always bears a security marking. This marking represents the level of sensitivity, which the originator has allocated to its contents when producing the document. The security marking also relates to the procedures for safeguarding the document, which are laid down in great detail in national or NATO security regulations. Classified documents always require physical protection. Their storage and transport are subject to strict regulations. The dissemination of classified information is subject to control. The security marking specifies the extent of protection required for the specific document.

In case of NATO originated information, all classified documents bear one of he following security markings, indicating the sensitivity of the contents of the respective document,

NATO RESTRICTED
NATO CONFIDENTIAL
NATO SECRET
COSMIC TOP SECRET,

here listed in ascending sequence. So a document bearing the security marking "NATO RESTRICTED" will contain information, the unauthorized disclosure of which would be undesirable to the interests of NATO, whilst the unauthorized disclosure of a document marked "COSMIC TOP SECRET" would result in exceptionally grave damage to the NATO organization. Accordingly, the procedures for safeguarding and handling classified documents vary with the different security markings. For NATO, the document "Security within the North Atlantic Treaty Organization" (1) contains in great detail all necessary regulations.

In most of the NATO member nations, national security regulations follow similar lines: a standard set of in most cases four security classification markings indicate the damage which might be caused through unauthorized disclosure, and enforce the necessary protection in handling and storage. Annex A, extracted from an AGARD paper, (2) shows an (updated) side-by-side listing of NATO and national security markings. Full details on security classifications within NATO and the NATO member nations may be taken from the AGARD Report No. 779 "Guide to Document Security Markings ..." (3).

In addition to the four security markings mentioned before, NATO uses the marking 'NATO UNCLASSIFIED' on its documents. Despite the fact that information bearing this marking is not classified and, therefore, does not need any security protection, it is subject to controlled distribution. A document with this marking can be released to all NATO staff, and to NATO-qualified users in the NATO nations, but it is not releasable to non-NATO nations, organizations, or individuals, without prior permission by the issuing agency. NATO UNCLASSIFIED documents are not releasable to the public.

Unfortunately, not all NATO nations use a similar marking on their national documents which require no security protection, but nevertheless are subject to controlled

distribution. So, whilst NATO classified documents are treated in accordance with the equivalent national security markings, the proper handling of NATO UNCLASSIFIED documents within an information system of most NATO nations requires appropriate attention by all personnel concerned.

NATO security regulations call for individual marking of clearly identifiable parts of complex documents, if they are of various levels of classification, or of no classification at all. So, a NATO document classified as `NATO SECRET' due to its contents, might well have an unclassified title, an executive summary classified `NATO CONFIDENTIAL',several paragraphs classified `NATO SECRET', others classified `NATO RESTRICTED', or even `NATO UNCLASSIFIED'. Figure 2 shows an example page of such a NATO document.

NATO SECRET

Document Title (NU)

Summary: ..... (NU)
.....
.....

Para 1: ..... (NC)
.....
.....

Para 2: ..... (NS)
.....
.....

Para 3: ..... (NR)
.....
.....
.....

NATO SECRET

Figure 2

This procedure has shown to be very helpful for the handling of classified documents within information systems. The marking 'NATO UNCLASSIFIED' next to a summary allows in many cases to use this summary as an abstract for the unclassified reference to the document in the data base. Unfortunately, not all NATO nations have adopted this procedure, at least they do not use it extensively.

Access to classified information is confined to people whose duties make such access essential. Within NATO and the NATO nations, the well-known `need-to-know-principle' is used to restrict access. Rank, appointment, and security clearance do not merit access to classified documents without the proper need-to-know.

NATO, of course, also produces a variety of documents which should be given a totally unrestricted distribution. Many AGARD products, such as this lecture series publication, may be taken as an example. These NATO products either bear no marking at all, or they are marked 'UNCLASSIFIED / UNLIMITED', meanning, that there is no limitation on their distribution.

3.2 Documents in Confidence

Apart from classified documents, a military information system will definitely hold unclassified documents, which nevertheless require certain protection, and are subject to special handling procedures. The main source for these documents are the defense contractors. Defense contractors carry out research on behalf of the Ministry of Defense. The result of such research are studies and technical reports, containing technical know-how and scientific findings. If the contents of such a document does not have any security implication, the document will of course not carry any security marking. Nevertheless, the information might be of high interest to a competitor because of its commercial value, since its knowledge might save years of research efforts and thereby much money.

To protect such a document adequately from disclosure to unauthorized individuals or organizations, distribution statements are used to denote the extent of its availability for distribution and disclosure. A distribution statement will normally be assigned by the originator of the document, advising the information system on the conditions, under which the document might be released to the users.

Distribution statements may also be applied in addition to security markings to classified documents. In these cases, both restrictions for release and distribution must be observed. Both serve the same purpose: To protect the

contents of a document from disclosure to unauthorized users. Whereas a classified document automatically enforces a limited distribution, namely to individuals with the need-to-know and the proper clearances only, an unclassified document is not automatically suitable for unlimited distribution. A few lines from DRIC Leaflet No. 8 (DRIC = Defence Research Information Centre, UK) will clarify the relation between these two terms (4):

"In Defence circles, if a document is not marked RESTRICTED or above, then it is UNCLASSIFIED; there is no lower security classification. Although UNLIMITED is often indicated as a security marking, it is strictly a distribution statement, and indicates that an UNCLASSIFIED document has been approved for release to the public. ... It must be clearly marked as being openly available, or bear a purchase price and have no restrictive marking.

To sum up, an UNLIMITED report must be positively identified (and marked) as such or bear a clear indication that it is suitable for public release; all other UNCLASSIFIED reports must be treated as documents with limitations on their distribution."

Whilst security markings are well defined within NATO and the NATO nations, and constitute a thoroughly usable tool for safeguarding classified information, document distribution statements are not standardized, they vary from country to country, and they require interpretation.

The aforementioned AGARD Publication (3) demonstrates the great variety of ancillary markings used within the NATO nations, gives necessary details for their understanding, and advises on the adequate treatment of the respective publications.

4. SECUTITY RISK ANALYSIS

To safeguard data and documents, i.e. the information available within an information system, certainly costs money. The instruments used to provide adequate system protection and to guarantee the necessary user services wherever required are to be carefully considered against the costs involved. Information systems, operating in most cases within network facilities, should be user friendly, open, and flexible. They cannot reasonably be protected against all methods of attacks and all types of accidents. Thus, hundred percent security will not be affordable, a rest risque will remain, and must be tolerated. But it must be the objective of all security considerations for an information system, to provide the maximum of security with the personnel and financial resources allocated for this purpose by the management.

To deal with the various aspects of security, a systematic approach to this complex problem area is indispensable. A risk analysis will identify risk areas, determine possible offences and assess the damage, ascertain the cause, and recommend preventive measures to avoid further incidents. Figure 3, derived from a recent publication in the Diebold Management Report (5) shows interdependencies and correlations. Many documents have been published on this subject, so I just want to recall a few essentials.

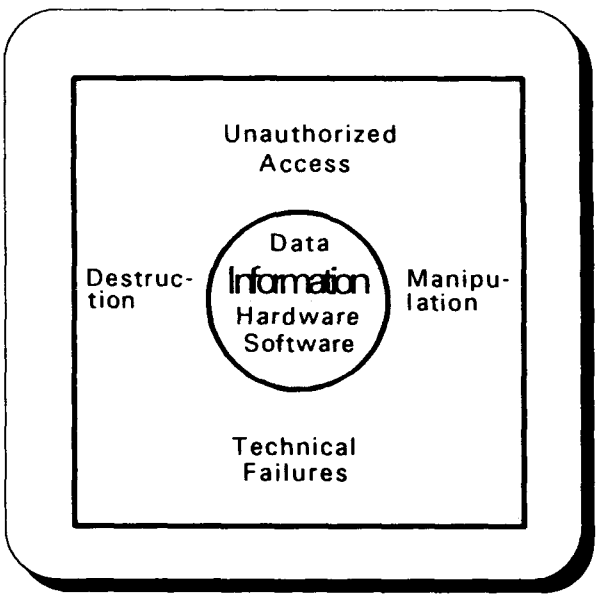

Figure 3

4.1 Risk Areas

The main target for security attacks is, of course, all the valuable information which is administered by the information system. In case of a referral type information system, the references in the database relate to the respective documents in the document collection. Therefore, both the database and the document collection will be the focal points which have to taken into consideration. But there are many more vital data that may be subject to attacks: user statistics, user

profiles, in short, all sort of management information.

Apart from the information, all hardware and software, which is necessary to operate the system and to provide its user services, is exposed to security attacks. Furthermore, the infrastructure of the system, its personnel, equipment, and its resources are to be considered within this context as well. Without going into any details, the necessary recommendations will be dealt with in the remarks covering the aspect of physical security of information systems.

4.2 Offenses / Damage

All data in the database must be protected against loss, destruction, and data manipulation. These actions may be either performed inadvertantly by systems personnel, or, the more grievious case, intentionally by saboteurs. Reading access to the database must also be restricted to authorized personnel only in order to ensure that information, which requires protection, is not revealed to trespassers. The document collection will be subject to theft, damage or destruction through fire, unauthorized inspection, or unauthorized copying. So the access to the document collection must be limited to authorized personnel only. The unintentional destruction of documents through system personnel is unlikely, however possible.

Data losses, and theft or destruction of documents, constitute a severe damage to any information system. In many cases, it will be impossible to reconstruct the data and to reprocure the documents. Apart from the more financial damage caused by such losses, the situation is aggravated by the fact, that in large collections it will be hard to assess the real extent of the losses. Valuable information is thereby no longer available, without even being noticed by the system management.

Any kind of data manipulation, be it inadvertantly or deliberately, is even harder to detect. The effects of manipulated data on the systems functions (its output, for example) will differ considerably, depending on the sort of data that has been altered. In a factual database, such criminal data manipulation might lead to failures in constructions or system design, resulting in high financial losses through faulty design, or it might even cause casualties.

If the database has been accessed by unauthorized people, the danger of misuse of the information must always be taken into consideration. Only if the extent of the violation (person who accessed the database, reason for the database access, time used for viewing or downloading data, number and quality of files accessed, etc) can be established or estimated, a vague damage assessment may be undertaken.

The risk of a misuse of protected information by unauthorized people will be even greater, if such person can get access to the document collection. Extracting a few important details from a document, or even photocopying the whole document, leaves no traces, and will hardly be detected.

Damage in the database or the document collection caused through unintentional data deletion or document destruction or through sabotage is hard to estimate. To make good for such losses is difficult, costly and labour intensive, and in many cases impossible. Due to the impossibility to judge the extent of data manipulations, the damage is extremely difficult to assess. Therefore, in many cases a costly and time-consuming data check is inevitable, followed up be at least a partly reconstruction of the database.

In all cases, especially when detecting unauthorized access to the database or illegal use of the document collection, the direct damage caused to the holdings of the system constitutes only the minor problem. The loss of integrity and accountability of the system interfere with the confidence of users and information suppliers. This may result in distrust to the information services provided by the system in the future, in withholding documents from inclusion in the systems holdings, or, worst, from using the system at all.

4.3 Causes

Neglecting all sort of force majeure, which, of course will probably destroy the whole system, the causes for data or system damages can be categorized into one of three classes: intention, technical/organizational failures, or carelessness. All previously mentioned risk areas may be subject to one or more security offenses, whether caused intentionally (sabotage, espionage), through carelessness (negligence, indolence,

sloppiness), or through fragmantary safety regulations and objectionable safety devices.

Damage caused intentionally to the system, its infrastructure, its equipment, especially to its information resources, will be aimed to serve one of two purposes: Either to hamper effective systems operations, thereby discriminating for example the image of the services. Or to gain personal advantages through gaining access to information, which would not have been available to the trespasser without his illegal activities. While there is adequate protection against sabotage in the conventional sense, i.e. destruction of hardware, equipment, theft of documents, etc, protection against unauthorized access to a database, or illegal software manipulation, for example, is much more difficult.

Technical failures in the equipment, especially in the fields of electronics, cause damages. Highly sophisticated technologies fail at unpredictable intervals, so damages resulting through technical malfunctions are not predictable, but must be expected and taken into consideration. Insufficient organizational safety precautions or fragmentary operational regulations are often the indirect reason for damages, caused through technical misfunctions or break-downs.

Damages caused through negligence must be expected, if the safety precautions, security regulations, and operating procedures are incomplete, full of gaps, not specific enough, or missing at all. Personnel used to do their routine work over the years, without ever experiencing any security incident, become insensible and insuspectible to the security aspects of their work. Then, if the unexpected security attack happens, they are not prepared for it. On the other hand, too many regulations and too complicated instructions may cause unconcern against security problems.

4.4 Prevention

To prevent security incedents, precautionary measures are essential. Effective precautions against security attacks will require the strict observance of detailed personnel security requirements, of physical security regulations, and of organizational directives. These three components must complement each other, and they must be well coordinated. And this coordination requires comprehensive and detailed knowledge of the organization of the system, its operations, the flow of work, user structure, services, documents. Changes within the system organization or in the sequence of operation may require adaptations or supplements, the expansion of the user community, or the offer of additional services, must evoke new considerations, resulting in revised security regulations. This important task should be entrusted as a full-time job to an official security officer.

4.4.1 Personnel Security

All personnel working in the system, whose duties necessitate access to classified information, need adequate security clearance. This applies not only to indexers and researchers, but also to clerical staff, data entry personnel, and staff concerned with document storage and reprographic services. In a military information system, security clearances will be practicable for most personnel. Observing the need-to-know principle mentioned earlier, however, the 'authority to know' should be carefully considered in each individual case, and should only be granted if absolutely necessary for the day-to-day work of the individual.

On the basis of the NATO Security Regulations (1), national regulations for all aspects of personnel security have been developed within the NATO nations. These regulations, however, are merely concerned with the handling of classified information. As stated earlier, similar protection is required for documents in confidence. So, appropriate supplementary regulations will have to be added as required to ensure reliable protection of this sort of information.

As far as personnel security is concerned, the security officer will have to initiate proper clearances for new personnel in the system, grant authority to know strictly on basis of the need-to-know-principle, brief all personnel on security matters in regular intervals, keep records on all personnel concerned, and debrief leaving personnel. It is essential that he is accepted by all personnel as a person, who is charged with the task to prevent security incidents to the benefit of the system, and not being looked at as a watch-dog of the management. With the necessary personal confidence, possible leaks in the security precautions will be reported by attentive personnel well before a security incident occurs.

4.4.2 Physical Security

Same as for questions related to personnel security, the guidelines for physical security requirements for safeguarding classified documents are laid down in the NATO Security Regulations (1), and have been adopted and specified in the respective national regulations. Physical security is concerned with requirements and the structural design for secure areas, strong rooms, and security containers. It deals with building security, describes the layout of secure store room facilities for classified documents, and describes in detail the adequate procedures for handling and transmitting classified information. So, a military information system needs some sort of vault, containers suitable for the storage of classified documents in offices, secure methods for transport of classified documents within the building, and a security registry for the acceptance, booking, accounting, and transmission of classified documents to the user. Part of the building may be declared as a secure area with special entry restrictions, the building itself probably being safeguarded in addition. Unclassified documents with distribution statements need not be kept in secure areas, but will probably be kept in a seperate collection apart from the general document collection. Their registration and handling will depend upon their markings, and will have to be laid down in additional regulations.

Again, it is the security officer who is responsible for the provision of appropriate facilities, and that the regulations for the physical security of classified documents are adhered to by all personnel concerned. He has to ensure that, for example, all the lock combinations are changed at regular intervals, check at irregular intervals that the stock of classified documents corresponds with the bookings, and that all the minute procedures for the handling of classified material are being followed.

4.4.3 Organizational Directives

Organizational measures are the third element within the security management structure. Incorporating all relevant NATO and national regulations, they will complement these rules, adapt them to meet the real situation within the information system, and ensure through detailed description that the local factors and circumstances are properly taken into consideration, and reflected in these instructions. Nevertheless, despite of the many details, these directives must be precise, evident, and catchy, and they must be acceptable by all personnel concerned.

The main objective hereby is not just to interpret and explain regulations, but to coordinate all necessary elements. Thus, questions of building security, entry procedures, pass system for employees and visitors, security clearances, need-to-know, handling of classified documents in the system, safe custody of classified information, procedures for disclosure of such information, and many, many more are to be harmonized and related to each other. And once these directives have been issued and the staff has been briefed, control and supervision must be exercised. Regular checks on the bookings of classified documents, on storage procedures, etc will be complemented by surprise checks on other details. Security exercises, provoking breaches of security regulations, are an excellent means to determine the existing security awareness, and to increase it.

5. INFORMATION WORK AND CLASSIFIED DOCUMENTS

Handling classified documents in an information system obviously requires extra efforts, calls for the pedantic observance of numerous regulations, puts an additional workload on the personnel, and charges all system personnel with high responsibilities. Nevertheless, there are good reasons to include classified documents in a military information system:

- Classified documents contain most likely especially valuable information,
- Classified documents ave only a very limited distribution to a few recipients only,
- Classified documents are not readily available for future users, because their existence is in most cases not recorded in bibliographies, abstracting journals, etc.

A study, caried out some years ago in the United States, supports these arguments (6). It clearly proved the above-average value of classified documents, rated by the system users. A defense information system must include classified documents in its holdings,

and provide this information to its users, whenever appropriate. Of course, adequate security standards have to be observed throughout the documentation and information process. As stated earlier, the main problem area is obviously the database which holds the references to the documents. The document collection itself is actually nothing else but a classified registry and storeroom, something that any military agency is used to handle, anyway.

5.1 Classified References

When operating a referral type information system, i.e. a system, whereby a database holds short references to the respective documents, the main question upon including classified documents in the system merely concentrates on the question whether to operate a classified database or whether to keep the information in the database unclassified. There are good reasons for the decision to operate a classified database. Information retrieval asks for a great conformity between the reference and the document itself, thereby guaranteeing maximum recall probability. Now, obviously, it is much easier to produce a classified reference of a classified document, than to produce a reference, which must not include any classified information, but still allows effective retrieval. On the other hand, the use of classified references in bibliographies, abstracting bulletins, etc enforces to classify these listings, too, thereby impeding their use.

To operate a classified database requires triple security arrangements: conventional security arrangements, conceptual precautions, and data-processing provisions. Conventional security arrangements will have to include infrastructural elements for all the data processing and storage areas, including entry restrictions and controls, and many more aspects of physical security which have been addressed earlier. Conceptual precautions, as part of the overall system layout, will include detailed control mechanisms for the whole input and output process. Data-processing provisions range from reliable procedures to database access control, user identification, etc, to questions of safe transmission lines, cryptograhic techniques, etc. Some of these questions will be covered in some more detail subsequently.

The decision for a classified database has extensive (and expensive) consequences for the technical system configuration. Depending upon the number of users, their locations, and the decision to grant them online access to the database, high efforts are indispensable to guarantee overall system security. To keep these efforts within reasonable limits, system management may well decide to grant access to classified references only through a terminal physically located within the information centre. Whether to operate an additional database for classified references, or include them in the overall database and just make classified references inaccessible from terminals outside the center, is irrelevant. This technique would require a user to do his subject search as usual. He would, in addition, get an indication, that the system holds classified information related to his subject. He would then have to apply for this additional information, and get it, after the proper clearances and the need-to-know have been ascertained.

5.2 Unclassified References

The decision to use unclassified references to classified documents facilitates database operations considerably. The advantages are obvious: The information system holds classified documents, and can provide them to authorized users. On the other hand, the efforts for shielding the references in the database can be reduced considerably. But, as inevitable in real life, there is of course a big disadvantage: The reference will differ considerably from the contents of the original document, causing problems in retrieval, and probably irritating the user on delivery. The following example describes the whole process, as it is used by the Defense Documentation and Technical Information System of the Federal Armed Forces of Germany (DOKFIZBw).

Documents with the security marking 'GEHEIM' or 'VS-VERTRAULICH', the German equivalents to 'NATO SECRET' or 'NATO CONFIDENTIAL', are of course administered in accordance with national security regulations, i.e. their receipt has to be acknowledged, they are accounted for in a special registry, kept in strong rooms, etc. Documents marked 'STRENG GEHEIM' (COSMIC TOP SECRET) are not handled by DOKFIZBw.

The content analysis in a referral type information system is aimed at producing a

reference, which can conveniently be stored in a database, and can easily be retrieved. The reference should also enable the user to decide, whether it is essential for him to procure and read the respective document it relates to. Therefore, a reference must include enough details from the original document to guarantee successful retrieval, and it must contain enough information for the user judgement, and for his decision. In case of DOKFIZBw, references include the name of the author of the document, or the originating institution/agency, as the case may be, the title of the document, pertinent bibliographic details such as the originating date, source of the publication, country of origin, language of the document, size of the document, etc. In addition to these data elements, which are extracted from the document, the indexer adds index terms to ensure retrieval, and composes an abstract for user information. These principles have been covered in one of the earlier papers.

To keep a reference to a classified document unclassified, requires certain precautions. The indexer must carefully avoid to mention any detail of the document which needs to be protected. This, of course, requires reliable judgement, common sense, and a fair extent of mistrust. Of great help is the individual marking of single parts of a document, which has been mentioned before. Actually, the originator of the document is sometimes the only person who can definitely decide, whether certain details (numeric values, frequencies, material data, performance data, costs, etc) are to be considered classified, or not. So, in some cases, it will be necessary to contact the author and ask his advice, if the indexer wants to include these details in the reference. The abstract will in most cases be of a more general nature, will use the typical indicative style, and omit giving facts and results. Indexing constitutes no additional problems for classified documents. If the title of the document, however, contains classified information, it must be altered. Such a 'fake title', of course, constitutes a considerable handicap for a successful information retrieval, especially if a bibliographic search for title wordings is carried out.

Actually, the authors of classified documents are predestinated to prepare unclassified abstracts - and titles, if required - to go with their documents. The indexing, however, should be left to experienced indexers, who will of course also give some finishing touch to the the authors abstracts, if required. In this way it is ensured that, on one hand, the references are retrievable in the database, that they contain enough information for the user, and, on the other hand, do not constitute a security risk for the unclassified database.

The reference will have to indicate somehow that it refers to a classified document. Whether this indication is given in clear-cut terms or in some way of coding, should be considered carefully. If the user is expected to understand that the result of a search contains references to classified documents, he should be advised accordingly. This might keep him from ordering classified documents in cases, when he does not want to use classified information for his specific purpose. In any case, it must be possible to exclude references to classified documents from a search result, if so desired.

The procedure explained above is well within security regulations. According to NATO security regulations, references to classified documents will not be classified unless the reference itself contains or reveals classified information. So, if national regulations approve of this principle, there is no reason for not following on these lines.

Unclassified references to classified documents may be used in bibliographies, abstracting journals, etc. However, it might be advisable to restrict the distribution of such products to a well defined user community. Whether, again, to reveal, that certain references relate to classified documents, or better to conceal this fact, is a more practical consideration. If the system is prepared to accept document orders from users, who unknowingly order classified documents, just to reject these orders with reference to the missing need-to-know, such an advice may be impracticable. If, however, the administrative effort for such denials is impracticable for the system, the user should be made well aware of the fact, that he is about to order a document which he will not receive due to lack of need-to-know.

5.3 Document Storage and Delivery

Classified documents are to be stored seperately in a special collection in a strong room or, under special circumstances, in secure containers. They have to be under control at all time. These procedures are

described in great detail in national security regulations.

For the practical work within an information service, the two main questions in handling classified documents are:

- How is the need-to-know ascertained?

and

- How are classified documents delivered to the user?

The majority of the users of a military information system will certainly be within military organizations. But also defense contractors, carrying out research on behalf of the Ministry of Defense, may be authorized system users. Regardless of the user, the need-to-know has to be established prior to document delivery. The safest way to ascertain the need-to-know for any user is certainly to refer his request to the originator of the document, and ask for his approval. This procedure, however, causes considerable administrative work, and it delays the delivery of the document in question. The situation becomes even more complicated when trying to get a release for older documents, in which cases the originating agency, for example, not holding an archive copy, does not even remember the contents of the document in question. In other cases it will be difficult to trace the originating agency because of staff reorganization.

In case of DOKFIZBw, most classified documents, which have been included in the system holdings, are physically not kept in the document collection of the center. They are stored in the classified registries of the producing Bundeswehr agency or, in cases of documents produced from outside the Bundeswehr (defense contractors, government agencies), in certain defined registries. Therefore, requests for delivery of classified documents are forwarded to these organizations, who have to ascertain the need-to-know, and deliver the document directly to the user. In these cases, the responsibility of the information system in respect of classified documents is reduced to merely providing the initial information, the reference. The system has no influence on the delivery of the document to the user. From the security point of view, this is probably the best procedure. Seen with the eyes of an information specialist, it certainly constitutes a most user-unfriendly delay, detour, and reduction in the information services.

In cases when the document is under custody of DOKFIZBw, i.e. when it physically rests in the security registry of the center, Head of DOKFIZBw ascertains the need-to-know for all Bundeswehr users. In all other cases, he has to refer the document requests to the originator of the document (or, in case of a non-Bundeswehr producer, to the contracting MOD branch), who will then take appropriate action.

Delivery of classified documents has to occur in accordance with security regulations. They describe exactly, how to convey classified information, depending on the security marking. Classified documents are transferred through security registry channels using courier services wherever possible. Records are kept at all times, so the utmost control is exercised.

For the work of the information system, the question, whether a classified document is lent out to a user for a certain period of time, or whether a copy is produced and given to him for retention, is of practical importance. Producing copies of classified documents is permissable. The procedures to follow are laid down in NATO and national security regulations. Seen from the security point of view, an additional copy of a classified document constitutes an additional security risk. Seen with the eyes of the information specialist, it makes more sense to send a copy to a user for retention. If another request for the very same document should come in, there will be no problem in responding promptly without having to wait for the return of the document from the first user.

6. INFORMATION WORK AND DOCUMENTS IN CONFIDENCE

Documents in confidence do not require security protection, as stated earlier in this paper. However, care must be taken to protect their sensitive contents from disclosure to individuals or organizations, who are not entitled to receive this information. To facilitate handling of such documents by personnel in an information system, the aforementioned distribution statements and ancillary markings are used. It is the responsibility of the information system to comply with the conditions, under which such

documents have been given to the system. In case of a violation of the entrusted privacy, the financial damage might well be burdened upon the system management. And, even worse, the distrust caused by such an incident might lead to the refusal to provide such valuable documents to the system in the future.

To illustrate the variety of distribution statements used in the NATO countries, a few examples (3):

DEFENCE PURPOSES ONLY
DISTRIBUTION LIMITED TO DEFENCE DEPARTMENTS
NOT FOR RELEASE TO INDUSTRY
COMMERCIALLY CONFIDENTIAL
COMMERCIALLY SENSITIVE
COMMERCIAL IN CONFIDENCE
NASA CONTRACTORS AND US GOVERNMENT AGENCIES ONLY
DISTRIBUTION AUTHORIZED TO US GOVERNMENT AGENCIES AND THEIR CONTRACTORS

If documents with distribution limitations are received from another country, all ancillary markings must be transferred and converted into the appropriate national markings. This requires considerable attention and experience by the systems staff. International cooperation by exchange of documents will only continue, and progress, if the submitting country can be sure, that all conditions, under which the documents have been submitted, are strictly observed by the receiving country.

Special care must be taken if documents from other NATO nations have been received, which contain proprietary technical information. Such documents must be handled in accordance with the NATO agreement on the communication of technical information for defence purposes (7), which states:

"When for defence purposes, technical information is communicated by a government or organization of origin, to one or more recipients as proprietary information, each recipient shall ... be responsible for safeguarding this information which has been disclosed in confidence. The recipient shall treat this technical information in accordance with any conditions imposed and take appropriate steps compatible with these conditions to prevent this information from being communicated to anyone, published or used without authorization or treated in any other matter likely to cause damage to the owner."

And the complementary implementing procedures (8) specify:

"All communications of technical information under the Agreement are made for information purposes only unless express consent is given to the contrary. The term `for information purposes' in these procedures means for purposes of assisting in the evaluation of the technical information for defence interests only and without prejudice to any rights of the owner. This term does not include the use, duplication or disclosure, in whole or in parts, for purposes of manufacture."

The preparation of references to documents in confidence is not critical from the security point of view. Nevertheless, caution must be excercised not to reveal just those confidential facts that are not to be disclosed to unauthorized readers. References to such documents will show the distribution limitation for the respective document, again either in a coded form, preferably in clear cut text, as well as the conditions for their release. References may be included in abstracting journals and bibliographies, again with the problem that users, misunderstanding the message of the distribution statement, order such documents, although they are not entitled to receive them. Such a disclosure of references, even to persons or organizations who will, consequently, not receive the documents, generally causes no damage.

Storage and delivery of documents with ancillary markings constitute no difficulties for an information system. The release should cause no problems, if the distribution statement is explicit and unmistakable. A marking as in the following (German) example "Freigegeben für BMVg. Freigabe für andere nur durch BWB-.... über BWB - AT III 6" clearly states, that the respective document may be delivered to personnel within the Ministry of Defense. For all other users, authority must be obtained from - in this case - the Federal Office of Defense Technology and Procurement. So, in many cases, it will be necessary to obtain authority for the delivery of such documents. Of course, complete records must be kept on the delivery of documents with distribution limitations or other ancillary markings, so that, in cases of suspected misuse, the release conditions may be backtraced.

7. SECURITY WITHIN COMPUTER NETWORKS

In addition to the points already made in regard to overall systems security, it is inevitable to address questions related *especially to computer security seperately*. Security in information systems, seen from the data processing and transmitting point of view, has three dimensions to consider: vulnerabilities, threats, and countermeasures. Each of the three dimensions, again, has three facets: Vulnerability may be considered in respect of the intellectual property of the system (data, programs), the physical property (computer equipment, data media), and the data processing services (performance of hardware and software). Threats are directed towards manipulation (falsification), destruction (system malfunction), or transmission (unauthorized access). Countermeasures may be taken in respect of hardware (physical access), software (operating system, application software), and organizational precautions (overall security policy). Using *these parameters, it is possible to describe*, which countermeasures protect which vulnerabilities against which threats (9).

The official German Security Criteria for Information Technology Systems (10) specify three main threats: loss of confidentiality, loss of integrity, and loss of availability. These threats must be appraised distinctively according to the respective type of information system. While, for example, the loss of confidentiality constitutes only a minor threat to a publicly available information system, it will be considered a major disaster in respect to any military information system.

7.1 Objectives

On the basis of these main threats, the three objectives for a network security policy have been derived (11):

- Protection of data confidentiality,
- Assurance of data and system integrity,
- *Assurance of system availability.*

The protection of data confidentiality will require considerations for user identification and authentication, user access procedures, one-way encryption of sensitive data through hardware or software tools, or password protection, depending on the nature of the data, and the level of protection required.

To assure data and system integrity, unauthorized use of the systems facilities must be excluded. And, failing to prevent an unauthorized access, such a security violation must be recorded, and detected reliably. All parts of the system are endangered by *potential abuse. Both, malicious or negligent* people, system personnel or end users, may try to violate the system integrity, either at the central system, through communication lines, or at the individual terminals. So, control of physical and logical access to all system parts must be excercised. By use of data validation, checksums, etc, data manipulations or data losses will become evident. Physical security arrangements, in connection with personnel security precautions, will minimize the danger in respect of loss of data integrity.

All services must be available at the operating times of the system. If malfunctions occur, or if some system components are not available at times, the user must be in a position to realize this nuissance, and he must be advised of the time until full services are available to *him again, and of possible alternatives in the* meantime.

In addition to the three objectives for information security stated above, two more objectives may be considered (12). Data authenticity, defined as representing reality, corresponding with facts, or correctness, should not automatically be treated as a characteristic of data integrity, but should constitute a seperate issue. Furthermore, the usefulness of data for a user needs to be looked at in respect of information security.

Security within any data processing system can only be achieved through an integrated overall approach (9). Such a concept for a secure information system will have to consider the operating system, the database management system, the interactive system, the application system, and the communication system. The overall system architecture must be considered in such a manner as to minimize the success of a technological attack. Especially the interfaces between the different *systems components need to be looked at* carefully.

7.2 Security Requirements

In 1985, fundamental security requirements for information systems have been published in the so-called 'Orange Book' by the US

Department of Defense (13). Secure systems, accordingly, will control, through use of specific security features, access to information in such a way that only properly authorized individuals will have access to read, write, create, or delete information. From this basic statement of objective, six fundamental requirements are deduced (literally extracted from DoD's Trusted Computer System Evaluation Criteria):

Requirement 1 - Security Policy:
There must be an explicit and well-defined security policy enforced by the system.

Requirement 2 - Marking:
Access control labels must be associated with objects.

Requirement 3 - Identification:
Individual subjects must be identified.

Requirement 4 - Accountability:
Audit information must be selectively kept and protected so that actions affecting security can be traced to the responsible party.

Requirement 5 - Assurance:
The computer system must contain hardware/software mechanisms that can be independently evaluated to provide sufficient assurance that the system enforces requirements 1 through 4 above.

Requirement 6 - Continuous Protection:
The trusted mechanisms that enforce these basic requirements must be continuously protected against tampering and/or unauthorized changes.

The document then presents detailed criteria derived from these fundamental requirements, and discusses the basic objectives (minimal, discretionary, mandatory, and verified protection), principles and guidelines. The fundamental requirements are the basis for the individual evaluation criteria, applicable to all evaluation processes. The criteria are divided into four divisions in a hierarchical manner.

7.3 Basic Functions

On the basis of the Orange Book, in 1989 the German 'Information Technology Security Criteria' (10) have been published. They state 8 basic functions to ensure information systems security:

Identification and authentication,
Right of access administration,
Right of access analysis,
Presentation of evidence,
Object reuse,
Fallback and recovery,
Assurance of functionality,
Transmission security.

These IT Security Criteria have been complemented and commented in the Information Technology Evaluation Manual (14), issued in August, 1990, by the German Government. So, there are sufficient guidelines, instructions, and manuals, not to mention the hundreds of publications, dealing with information system security. The fundamental problem, as far as the system management is concerned, is the question of implementing the necessary security functions.

Considering the basic functions of identification and authentication, two aspects must be observed: Identity must be ensured unmistakably, and a deception of the mechanism for authentication must be excluded. Authentication may be executed by means of property (machine readable pass in combination with a personal reference number), by means of knowledge (user identification code in combination with a password), or by means of characteristics (finger prints, voice, signature). Voice decoding, fingerprints, and eye background identification are successfully used to control physical access to restricted areas. For online access to a database, however, the well-known password access system is still indispensable. It should be realized by all concerned that passwords may be passed on to other people, and are often easy to guess or to find out because of the mnemonics the individual choose in order not to forget his own password. Nevertheless, if the password procedure is used carefully, and the rules for selecting passwords, changing passwords at short intervals, etc are observed, this instrument gives good protection against unauthorized access.

The administration of the rights of access is mainly directed towards completeness, absence of inconsistencies within, and lucidity of the structure of rights. All subjects (individuals) and objects (data, system resources) which fall under the rights of

access administration have to be registered. So there will be access rights for each individual user, and for each data base, or part of it, if necessary. To avoid problems within the structure of rights it is essential to ensure that newly awarded rights entail no conflicts with already existing rights. To avoid unintentional interrelations in complex right structures it is essential to keep these structures as clear-cut and uncomplicated as possible.

The access analysis should occur early in the accessing process, i.e. in the data base opening process prior to the real data access. The analysis must cover all circumstances, so before each transaction a check on the admissability is performed. The data for this analysis (matrix on users and their rights) must be available at all times. Because these data are higly sensitive, they are stored in a specially protected file, probably in a coded format, and it must be ensured that in case of a malfunction in this part of the system, no uncontrolled access to the system is granted.

To determine any misuse of the data or system services through unauthorized users, through users exceeding their rights to access, or through systems personnel, it is essential to be able to back-trace all transactions carefully. This implies to prohibit any attempt to deceive the records, for example through misleading transactions, by recording actions, which actually did not occur. On the other hand, these recordings must be complete, and it must be impossible to bypass these mechanisms intentionally or unintentionally, as the case may be, if for instance the protocol file happens to overflow. Thus, it must be guaranteed to determine, at all times, who (user identity, password identification) initiated which activities (multiple access attempts, access to which files, attempts to initiate actions beyond his rights of access), and which results he achieved (downloading of date, printouts).

For online users, information systems automatically assign part of the storage space for each user, as required. To avoid the reconstruction of data, which had been stored temporarily by an eralier user, through a succeeding user, it must be ensured that the previous data are not just deleted by a marking in the inventory file, but that a real deletion by overwriting the data occurs. This applies of course not just for the system working memory area, but is true for all magnetic storage media which are used for multiple data transfer.

Fallback and recovery, as well as the assurance of functionality, constitute a common complex. System failures, causing partial or complete service interruptions, must be detected immediately and accurately. Any action responsible for such malfunctions must be traced reliably, the malfunction must be repaired, and future incidents through the same source of error must be excluded. For certain vital functions, backup mechanisms will be provided which automatically take over operation in case of a main system malfunction. One main concern is the completion of all actions which have been initiated prior malfunction, i.e. any writing actions must be completed without data loss, data bases must be closed correctly, users should be made aware of malfunctions which influence their work. To overcome major system failures, emergency procedures and contingency plans should be prepared in advance.

The main aspect concerning the basic function of transmission security is closely connected to data condidentiality. Access control, identification, authentication, and authorization are questionable as far as online data transmission is concerned. To guarantee on-line confidentiality it is essential to either use shielded transmission lines, or to use data encryption. This special field of network security actually deserves seperate considerations, and the discussion of existing or forthcoming technical solutions would be beyond the scope of this paper. For the same reason, I just want to mention two other phenomena which are of great concern, and need to be considered: Electromagnetic radiation, especially at the user terminals, which can be suppressed through the use of tempest-proof equipment, and the incalculable dangers through computer viruses and Trojan horses. Countless journal articles describe the problems caused by virus attacks, and give advice for protection. A good overview of the actual situation is given in the book 'Computer Under Attack' by Dennis (15).

To conclude this excursion into network security, it seems appropriate to state that protecting a network against misuse requires considerable efforts. It is impracticable to ensure total security against all thinkable threats. However, adequate protection can be ensured through a well coordinated combination of efforts.

8. HOUSEKEEPING

For many classified documents, the necessary level of protection decreases as time goes by. The same is true for documents with distribution statements, which, after some time, are made available to the public, therefore no longer requiring any special handling by the information system. It is up to the system management to ensure that necessary actions are taken to observe all changes which influence the degree of protection for these documents.

Classified documents may need to be downgraded to a lower security level, or even become unclassified, as the case may be. This may happen on a purely time basis (automatic downgrading), the date for downgrading or declassification being stated already in the document on publication, or it may be announced on a case-by-case basis by the originating authority. To ensure prompt action, it is essential to record possible downgrading dates right on receipt of the documents, and keep track of these actions. As the timespan to consider will normally cover some years, a database holding the necessary data elements is quite helpful. The procedures for downgrading or declassification are, once again, laid down in detail in security regulations.

In case of documents which carry distribution statements, similar procedures have to be adopted. The distribution statements have to be suspended, stating date and authority for this action. However, whilst for classified documents, the originator is required to periodically check on the necessity for the level of security protection for the documents he originated, a similar obligation for the originators of documents with ancillary remarks will rather be the exception. So an information center is likely to handle documents with special care, which are in the meantime openly available to the public.

In both cases, when downgrading or declassifying classified documents, or when cancelling distribution limitations, it is essential to notify the users, which have been provided with document copies. Again, a data base with the relevant information will be of great help for this administrative task.

The destruction of classified documents, which are outdated or dispensable for any other reason, or of obsolete documents bearing distribution limitations, has to be done in accordance with security regulations. For classified documents, strict procedures apply, and records with all necessary details are to be maintained for some years. It certainly is advisable to keep similar records on documents in confidence, too.

One final step needs to be done: References to documents, which have been downgraded or declassified, or which no longer carry a distribution limtation, must be altered to reflect these changes. And, of course, if documents have been removed from the document collection, the respective references must be deleted as well in the data base.

9. CONCLUSION

To handle classified documents or documents in confidence within any information system requires high efforts, and imposes considerable delicacies on the day-to-day working routines. However, the necessary protection can be granted, if the basic principles for information system security are observed. A combination of physical security provisions, personnel security considerations, and organizational security regulations, considering the special aspects of computer network security, guarantee the necessary protection.

10. REFERENCES

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(3) Sharp, E.T,; Molholm, K.N. (Editors), "Guide to Document Security Markings and Distribution Statements Used by NATOand NATO Member Nations", AGARD R 779, March 1991.

(4) DRIC Leaflet No 8, "Unclassified or Unlimited", Defence Research Information Centre, Glasgow, UK.

(5) Behler, K., "Die richtigen Prioritäten setzen", Diebold Management Report, 5, Oktober 1991, S. 8-14.

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(7) "NATO Agreement on the Communication of Technical Information for Defence Purposes", BGB Teil II, Nr 39, S. 985ff, 1973.

(8) "Implementing Procedures for the NATO Agreement on the Communication of Technical Information for Defence Purposes", BGB Teil II, Nr. 39, S. 993ff, 1973.

(9) Weck, G., "Concept for a Secure Information System Consisting of the Components Operating System, Database, Dialogue System, and Applications", BMFT-FB-DV 83-005, Dezember 1983 (in German).

(10) Zentralstelle für die Sicherheit in der Informationstechnik (Hrsg), "IT - Sicherheitskriterien - Kriterien für die Bewertung der Sicherheit von Systemen der Informationstechnik", Köln, GE, Bundesanzeiger Verlagsgesellschaft mbH, 1989, ISBN 3-88784-192-1.

(11) Wong, K., "Security in Communication Networks", Datenschutz und Datensicherung, 1987, Oktober, S. 498-502.

(12) Parker. D.B., "Neuformulierung der Grundlagen der Informationssicherheit", Datenschutz und Datensicherung, 11, November 1991, S. 557-563.

(13) "Department of Defense Trusted Computer Systems Evaluation Criteria", DOD 5200.28-STD, Washington D.C., USA, December 1985.

(14) Zentralstelle für Sicherheit in der Informationstechnik, "IT - Evaluationshandbuch - Handbuch für die Prüfung der Sicherheit von Systemen der Informationstechnik", 1. Fassung, Gemeinsames Ministerialblatt 1990, Nr 23, S. 429ff, 15. August 1990, ISSN 0341-1435.

(15) Denning, P.J. (Editor), "Computers Under Attack - Intruders, Worms, and Viruses", New York, New York, USA, ACM Press, 1990, (ISBN 0-201-53067-8).

Annex A

Side by Side Listing of Military Security Categories

NATO	COSMIC TOP SECRET	NATO SECRET	NATO CONFIDENTIAL	NATO RESTRICTED
Belgium	TRES SECRET	SECRET	CONFIDENTIEL	DIFFUSION RESTREINTE
Canada	TOP SECRET	SECRET	CONFIDENTIAL	- - -
Denmark	YDERST HEMMELIGT	HEMMELIGT	FORTROLIGT	TIL TJENESTEBRUG
France	TRES SECRET DEFENSE	SECRET-DEFENSE	CONFIDENTIEL-DEFENSE	DIFFUSION RESTREINTE
Germany	STRENG GEHEIM	GEHEIM	VS-VERTRAULICH	VS-NUR FÜR DEN DIENSTGEBRAUCH
Greece	AKROS APORRITO	APORRITO	EMPISTEFTIKO	PERIORISMENIC CHRISSEOS
Italy	SEGRETISSIMO	SEGRETO	RISERVATISSIMO	RISERVATO
Luxembourg	COSMIC TRES SECRET	SECRET	CONFIDENTIEL	DIFFUSION RESTREINTE
Netherlands	ZEER GEHEIM	GEHEIM	CONFIDENTIEEL OR VERTROUWELIJK	- - -
Norway	STRENGT HEMMELIG	HEMMELIG	KONFIDENSIELT	BEGRENSET
Portugal	MUITO SECRETO	SECRETO	CONFIDENCIAL	RESERVADO
Spain	SECRETO	RESERVADO	CONFIDENCIAL	DIFUSION LIMITADA
Turkey	COK GIZLI	GIZLI	ÖZEL	HIZMETE ÖZEL
United Kingdom	TOP SECRET	SECRET	CONFIDENTIAL	RESTRICTED
United States	TOP SECRET	SECRET	CONFIDENTIAL	- - -

SELECTIVE BIBLIOGRAPHY ON THE USE OF SCIENTIFIC AND TECHNICAL REPORTS LITERATURE

This bibliography has been prepared by the Documentation Department of the National Aerospace Laboratory (NLR), Amsterdam, The Netherlands, in support of the 1992 Travelling Seminar of AGARD on "Basic Documentation Practices". The selection of the references has been made in consultation with the Seminar Director, Ms Christine Walker, Head, Information Services, SHAPE Technical Centre, The Hague, The Netherlands.

CONTENTS

I. NATIONAL INFORMATION SCENES AND POLICIES

National and International information policies
Schipper, W.; Cunningham, A.M.
National Federation of Abstracting and Indexing Services, Philadelphia, PA, USA.
ISBN: 0-92430-831-X, 161p.

BELGIUM
The treatment of grey literature (in French)
Salmon, C.J.; Service Documentation, LABORELEC, Linkebeek, Belgium.
Conference paper 09, 8p.
In: AGARD Conference Proceedings, Planning and Designing Effective Defence and Related Information Services, Ankara, Turkey, 10-11 Sept. 1986.
AGARD-CP-416, 120p.; ISBN-92-835-0417-8; N87-26675. Avail.: NTIS HC A06/MF A01.
Definitions are given of grey literature and its advantages are given, with matters of identification and presentation. The collection and obtaining of documents is discussed and who should be responsible for it. Information is given on the formation of SIGLE (System for Information on Grey Literature in Europe) and the standardisation so far achieved. Similar details are given of EAGLE (European Association for Grey Literature Exploitation). A few notes are given on work of this nature in Belgium.

FRANCE
Advantages gained by the government from a coordination of defense-aerospace information
Paoli, C.; Centre de Documentation de l'Armement, Paris, France.
Conference paper 10, 8p. In: AGARD Conference Proceedings: Use of Scientific and Technical Information in the NATO Countries, Rome, Italy, 29-30 Sept. 1982, AGARD-CP-337, 140p., ISBN 92-835-0325-2, N83-31531, Avail.: NTIS HC A02/MF A01.
The benefits derived by government authorities from the coordination of information in the sectors of defense and aerospace are described through the organization of the French Armament Documentation Center (CEDOCAR) as regards bibliographic and factual information, the Research Design and Engineering Directorate (DRET), and its Contractors as regards information relating to research programs. Data flows and transfers within the structures of these agencies are analyzed.

GERMANY
Aerospace information in the Federal Republic of Germany
Bürk, K.
Fachinformationszentrum für Energie, Physik, Mathematik G.m.b.H., Eggenstein-Leopoldshafen, West Germany, Energy and Technology Div.
Conference paper 9p., In: Information - documentation; European Forum, Strasbourg, France, 17-19 Jan. 1990, Proceedings (A90-44786), p. 9-17.
Association Aeronautique et Astronautique de France, Paris, France, 1990.
The specialized way that aerospace information is distributed in the Federal Republic of Germany is discussed. The objectives of this policy are explained and the role of the government in it is pointed out. FIZ Karlsruhe is described as an example of the policy. The development of a German national aerospace data base is examined, and the possibilities of international cooperation in the development of the data base are addressed.

Information resources management in the R and D environment
Bürk, K.
Fachinformationszentrum für Energie, Physik, Mathematik G.m.b.H., Eggenstein-Leopoldshafen, West Germany, Energy and Technology Div.
Conference paper 10, 4p.
In: AGARD Conference proceedings The Value of Information as an Integral Part of Aerospace and Defence R and D Programmes, Cheltenham, UK, 4-5 Sept. 1985, AGARD-CP-385, 100p., ISBN 92-835-0389-9; N86-28793 Avail.: NTIS HC A05/MF A01.
Efficient management of highly specialized information is a permanent task of optimization, whereby framework conditions may constantly change on account of various influencing factors. Owing to their special significance, the following has to be considered in particular: user needs, available resources, and information techniques. The task of optimization, due to its complexity, cannot be solved model-like, but only approximately and pragmatically. Illustrated by the example of the Federal Republic of Germany and the Fachinformationszentrum Energie Physik Mathematik (FIZ) the attempt to find a practical solution is demonstrated.

GREECE
The objectives and role of the Greek National Documentation Centre
Bouboukas, V.; Skourlas, C.; Poulakaki, E.
National Documentation Centre, National Hellenic Research Foundation, Athens, Greece.
Conference paper 01, 4p. In: AGARD Conference Proceedings, The Organisation and Functions of Documentation and Information Centres in Defence and Aerospace Environments, Athens, Greece, 19-20 Oct. 1988; AGARD-CP-445, 118p.;
ISBN 92-835-0496-8; N89-23362, Avail.: NTIS HC A06/MF A01.
The objectives and the role of the centre are outlined.

ITALY
Grey literature (classification problems) in Italian
De Castro Pietrangelo, P.
Instituto Superiore di Sanita, Roma, Italy.
Meeting on presentation of scientific texts, electronic editing with personal computer course (ISTISAN 91/39),20-22 Nov. 1990, Rome, Italy p. 61-81.
Instituto Superiore di Sanita, Rome, Italy, 1991, 116p.
This paper considers literature which is difficult to classify under normal catalogue systems. It refers particularly to the activities of the Italian Library Association, since 1985, and similar ones in the USA and Great Britain. Typical examples of 'grey literature' can be reports, which can cover many subjects, problems and research work and the general characteristics of such literature are considered. Bibliographical difficulties led to the setting up of SIGLE (System for Information in Grey Literature in Europe) and similar organisations. The work of these is analysed and examples are given of some results, aimed at some unification of working methods (12 refs.)

THE NETHERLANDS
Online bibliographic data bases and grey literature: a Dutch approach
van der Meer, K.
In: Nancy Fjallbrant, IATUL, Goeteborg, Sweden
11th International Association of Technical University Libraries, Conference proceedings on the future of information resources for science and technology and the role of the library, 15-19 April 1985, Oxford, UK.
International Journal of Micrographics & Video Technology, vol.4, no.2, 1985
CODEN: IJMTDZ ISSN: 0743-9636.
Active acquisition of reports and other species of grey literature within science and technology, by a number of technology-related institutes collaborating on this topic, such as in the Netherlands, is advocated. After the reports are acquired, these must be made accessible on subject. The role of international data base producers and the advantages and profits of this to the users and to the collaborating institutes are highlighted

Royal Netherlands Armed Forces Scientific and Technical Documentation- and Information-Center (TDCK)
Gruetzmacher, E. Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, The Hague, The Netherlands.
Conference paper 02, 14p. In: AGARD Conference Proceedings, Use of Scientific and Technical Information in the NATO Countries, Rome, Italy, 29-30 Sept. 1982; AGARD-CP-337, 140p., N83-31531, Avail.: NTIS HC A02/MF A01.
The history; organization, tasks and authorizations; service rendering; user's circle and informations-sources; and recent internal developments of TDCK are summarized.

International information exchange
Dijk, J.E.van ; Heijnen, J.H.M.; Rosenbrand, P.J.C.; Vries, H F. de;
Netherlands Bibliographical and Documentary Committee, (COBIDOC), Amsterdam, The Netherlands.
Conference paper 06, 5p.
In: AGARD Conference Proceedings, Use of Scientific and Technical Information in the NATO Countries, Rome, Italy.
AGARD-CP-337, ISBN 92-835-0325-2; N83-31531 140p., Avail.: NTIS HC A02/MF A01.
The importance and size of report literature, some cases of international cooperation in establishing bibliographic data bases are considered. A model for international cooperation is discussed in relation to the necessity of making arrangements at a governmental level. Duplication of input should be avoided.

PORTUGAL
An Academic library network for Portugal
Cornish, G.P.
Information Management Report, Jan.1992, p.10-11.
PORBASE, the national Portuguese language database is described.

TURKEY
The Informatio Scene in Turkey
Kaya, D.; Tuncer, N; Urundul, E.
ARGE, Ankara; YÖK, Ankara; TÜrdok, Ankara, Turkey.
Conference paper 01, 3p. In: AGARD Conference Proceedings, Planning and Designing Effective Defence and Related Information Services, Ankara, Turkey, 10-11 Sept. 1986. AGARD-CP-416, 120p., ISBN 92-835-0417-8; N87-26675.
Avail.: NTIS HC A06/MF A01.
Three important documentation centers, i.e. TÜRDOK, YÖK and ARGE are described. Gerneral problems and shortcomings in the information process are discussed.

UNITED KINGDOM
The Defence Research Information Centre (DRIC): services and new developments.
Farquhar, G.; Defence Research Information Centre, Glasgow, United Kingdom.
Aslib Proceedings, 41 (5) Mar 89, 169-178. illus.
DRIC is the Ministry of Defence's central deposit and dissemination point for defence scientific and technical literature to the UK and overseas defence community. Describes the computer facilities, report acquisitions, holding and handling, DRIC holdings and customer services, and IT projects.

Automation at the British Library Lending Division: present situation and future plans
Wheatley, M.L.; British Library Lending Division, Boston Spa, UK.
Program, vol.19, no.2, p. 127-39, April 1985; CODEN: PRGMBD ISSN: 0033-0337.
The main automation systems at the British Library Lending Division are based on three minicomputers: system for receiving users' loan and photocopy requests as well as for information about the Lending Division's users; accounting system for users' deposit accounts; system which maintains details of serials received by the Lending Division and provides various working tools which are to include online retrieval by keyword of serial titles; it also supports part of a system to produce a publication British Reports, Translations and Theses (BRTT) as well as a system for record creation of UK input to the System for Information on Grey Literature in Europe (SIGLE);a system for monograph acquisitions and cataloguing. The minicomputers may eventually be linked to the British Library Wide Area Network

UNITED STATES OF AMERICA
Defense Technical Information Center (DTIC) chronology of selected reports, policy instruments, and significant events affecting Federal Scientific and Technical Information (STI), 1945-1990
Kramer, A.E.; Defense Technical Information Center, Alexandria VA, USA.
AD-A241550; 92N13889; DTIC/TR-91/4; 15p., Avail.: NTIS HC/MF A03.
This technical report is a chronology that highlights the more significant events and achievements relating to DTIC and its role in providing STI from the information sources to the user community, 1945-1990.

NASA's space-age information program
Day, M.S.
BIIS Corp., Herndon, VA, USA
IAF-PAPER-91-691, 6p., 9 refs.
In: International Astronautical Federation International Astronautical Congress, 42nd, Montreal, Canada, Oct. 5-11, 1991.
The paper presents a historical overview of the NASA Scientific and Technical Information Program and of its development into the central international information program serving the world's aerospace community. Special attention is given to the role of the American Institute of Aeronautics and Astronautics (AIAA) society in the information dissemination. It is noted that the subject scope of the contents of the International Aerospace Abstracts journal published by the AIAA parallels the subject content of the NASA's STAR abstract journal that covers the world's aerosphace 'grey' literature, and that the machine-readable contents of both journals are merged by the NASA Information Facility into the comprehensive machine-searchable NASA bibliographic data base.

U.S. Air Force Scientific and Technical Information Program - The STINFO Program
BLADOS, WALTER R.
National Aeronautics and Space Administration, Washington, DC. USA.
Government Information Quarterly (ISSN 0740-624X), vol.8, no.2, 1991, p.135-153. 12 refs. Journal Article 19p. 91A35438.

STINFO program has as its main goal the proper use of all available scientific and technical information in the development of programs. The organization of STINFO databases, the use of STINFO in the development and advancement of aerospace science and technology and the acquisition of superior systems at lowest cost, and the application to public and private sectors of technologies developed for military uses are examined. STINFO user training is addressed. A project for aerospace knowledge diffusion is discussed.

Technology transfer at NASA - A librarian's view
Buchan, R.L.
NASA Scientific and Technical Information Facility, Baltimore-Washington International Airport, MD, USA.
Conference paper, 9p., 91A29798. In: Technology transfer: The role of the scientific - technical librarian. New York, Haworth Press, 1991, p. 49-57.

The NASA programs, publications, and services promoting the transfer and utilization of aerospace technology developed by and for NASA are briefly surveyed. Topics addressed include the corporate sources of NASA technical information and its interest for corporate users of information services; the IAA and STAR abstract journals; NASA/RECON, NTIS, and the AIAA Aerospace Database; the RECON Space Commercialization file; the Computer Software Management and Information Center file; company information in the RECON database; and services to small businesses. Also discussed are the NASA publications Tech Briefs and Spinoff, the Industrial Applications Centers, NASA continuing bibliographies on management and patent abstracts (indexed using the NASA Thesaurus), the Index to NASA News Releases and Speeches, and the Aerospace Research Information Network (ARIN).

Scientific and technical information management
Wente, V.A.
Government Information Quarterly (ISSN 0740-624X), vol. 7, no. 2, 1990, p.149-167.

The NASA Scientific and Technical Information (STI) Program is examined. The history of the NASA STI program is reviewed and the organizational structure of the STI program is outlined. The relationship between the NASA STI program and the AIAA Technical Information Service is described. Consideration is given to the documentation of aeronautics and space research, the dissemination of NASA STI, the acquisition of information of NASA research and development, and the managerial aspects of the NASA STI Program. The role of NASA/Recon, the Aerospace Database, and abstract journals such as IAA and STAR in processing STI for utilization in research programs is discussed.

NASA's experience in the international exchange of scientific and technical information in the aerospace field
Thibideau, P.A.; National Aeronautics and Space Administration, Washington, DC, USA; Conference paper NASA-TM-103093; 90N25704; 11p. Presented at the Annual Meeting of the German Society for Aeronautics and Astronautics (DGLR), Hamburg, Fed. Republic of Germany, 2-4 Oct. 1989. Avail.: NTIS HC A03/MF A01.

The early NASA international scientific and technical information exchange arrangements were usually detailed in correspondence with the librarians of the institutions involved. While this type of exchange grew to include some 200 organizations in 43 countries, NASA's main focus shifted to the relationship with the European Space Agency (ESA), which began in 1964. The NASA/ESA Tripartite Exchange Program provides more than 4000 technical reports from the NASA-produced Aerospace Database. The experience in the evolving cooperation between NASA and ESA has established the model for more recent exchange agreements with Israel, Australia, and Canada. The results of these agreements are made available to participating European organizations through the NASA File.

II. USERS STUDIES

The NASA/DOD aerospace knowledge diffusion research project
Pinelli, T.E.; NASA, Langley Research Center, Hampton, VA, USA;
Kennedy, J.M., Indiana University, Bloomington, USA.
Preprint, 13p., 31 refs., 91A41123.
Defense Technical Information Center, Managers Planning Conference, Solomon's Island, MD, 1 May 1991.

The project examines how the results of NASA/DOD research diffuse into the aerospace R&D process, and empirically analyzes the implications of the aerospace knowledge diffusion process. Specific issues considered are the roles played by government technical reports, the recognition of the value of scientific and technical information (STI), and the optimization of the STI aerospace transfer system. Information-seeking habits are assessed for the U.S. aerospace community, the general community, the academic sector, and the international community. U.S. aerospace engineers and scientists use 65 percent of working time to communicate STI, and prefer 'internal' STI over 'external' STI. The isolation from 'external' information is found to be detrimental to U.S. aerospace R&D in general.

The strategic use of information resources - An exploratory study
King, W.R.; Grover, V.
Pittsburgh, University, PA; South Carolina, University, Columbia
IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. 38, Nov. 1991, p. 293-305. 50 refs.

The authors present some extensive preliminary data on the strategic use of information resources. The objectives are to: (1) make a case for the need to distinguish between the two types of information resources, information and information technology (IT), in the context of competitive strategy; (2) provide preliminary empirical validation for the distinction based on a survey of senior information system (IS) executives representing 84 large US corporations; (3) analyze the organizational factors that facilitate or inhibit the use of information resources; and (4) report on the organizational decision-making processes currently being used by business firms for strategic IS applications.

An investigation to find appropriate measures for evaluating interactive information retrieval.
Su, L.
In: J. Katzer; G.B. Newby (Editors), ASIS'89: Managing Information and Technology. Proceedings of the 52nd Annual Meeting of the American Society for Information Science, Washington, D.C., 30 Oct.-2 Nov. 1989;
Learned Information, Inc., Medford, New Jersey, Volume 26, p.13-23. 30 refs

Study prompted by controversies in information retrieval (IR) evaluation literature with respect to the measurement and evaluation of an information retrieval system. Aims to explore and describe ranges of user judgement behaviour with respect to information retrieval performance and to suggest relationships among various measures chosen.

External information in the enterprise - Why and how? (In French)
L'information externe dans l'entreprise - Pourquoi et comment?
Calmon, J.; SNECMA, Paris, France
Conference paper, 31p. 9refs.; In: Information - documentation; European Forum, Strasbourg, France, Jan. 17-19, 1990, Proceedings p. 25-55.
Association Aeronautique et Astronautique de France, Paris, France, 1990

The interaction between external information and the strategy of an aviation-industry enterprise is considered in the framework of the subdivision of external information into human-resources, commercial, and financial functions.

Information technology applications: A British Aerospace Military Aircraft Ltd view
Hall, K.; British Aerospace Public Ltd. Co., Preston (England) Project Management Systems; Conference paper 16, 16p.
In: AGARD, Electronic Transfer of Information and its Impact on Aerospace and Defence Research and Development, Brussels, Belgium, 17-19 Oct. 1989.
AGARD-CP-466, 1990, 192p.;ISBN 92-835-0550-6; N90-22440,
Avail.: NTIS HC A09/MF A02

The current situation is described with reference to typical conflicting requirements and the dynamic, competitive background.

Benefits of scientific and technical information services for aerospace and defense
Lawrence, B.
American Inst. of Aeronautics and Astronautics, New York, NY, USA.
Technical Information Services.
Conference paper 02, 4p.
In: AGARD Conference Proceedings, Planning and Designing Effective Defence and Related Information Services, Ankara, Turkey, 10-11 Sept. 1986.
AGARD-CP-416, 120p.; ISBN-92-835-0417-8; N87-26675. Avail.: NTIS HC A06/MF A01.
The benefits of having an aerospace and defense scientific and technical information service are considered based on an understanding of the literature in the field. The functions of a centralized information center and the nature of the research and development process are discussed.

A model of a defence information service as seen by the user
Aubrey, B.F.
National Defence Headquarters, Ottawa (Ontario), Canada,.
Directorate Scientific Information Services.
Conference paper 03, 5p.
In: AGARD Conference Proceedings, Planning and Designing Effective Defence and Related Information Services, Ankara, Turkey, 10-11 Sept. 1986.
AGARD-CP-416, 120p.; ISBN-92-835-0417-8; N87-26675. Avail.: NTIS HC A06/MF A01.
Services provided by defense information agencies in identifying, acquiring, organizing, subject analyzing, announcing and disseminating recorded knowledge are illustrated through a number of mini-scenarios describing typical situations in which a potential user of a defense information service may find himself.

III. LIBRARY AND INFORMATION CENTRES: PLANNING AND EVALUATION,

Small Libraries: A Handbook for Successful Management
Reed, Sally G.
McFarland & Co, Jefferson NC, USA; LCCN 90-050813; 1991, 156
ISBN 0-89950-596-1

Planning, Measuring & Evaluating Library Services & Facilities
Cummins, T.R.
Neal-Schuman, ISBN 1-55570-070-5; 1992, 350p.

Strategic planning basics for special libraries
Asantewa, D.
Special Libraries Association, Washington DC, USA ;ISBN 0-87111-399-6; 1992

Special libraries ; a guide for management
Christianson, E.B.; King, D.E.; Ahrensfeld, J.L.
Special Libraries Association, Washington DC, USA; ISBN 0-87111-380-5; 1991, 92p.

A manual on the evaluation of information centers and services
Griffiths, J.-M.; King, D.W.; King Research, Inc., Rockville, MD, USA
Advisory Group for Aerospace Research and Development (AGARD), Neuilly-Sur-Seine (France). Technical Information Panel.
AGARD-AG-310, 1991, 128p.; ISBN-92-835-0614-6 91N25959; Avail.: NTIS HC/MF A07
The manual emphasizes the use of evaluation measures, models and methods and includes data and results from actual studies. It also includes a comprehensive bibliography.

Evaluating the Effectiveness of Information Centres and Services
Advisory Group for Aerospace Research and Development (AGARD), Neuilly-Sur-Seine (France).
AGARD-LS-160; 1988, 96p.;ISBN 92-835-0479-8; 89N11625, Avail.: NTIS HC
Lecture series held in Luxmebourg, 5-6 Sept. 1988, in Athens, Greece, 8-9 Sept. 1988 and in Lisbon, Portugal, 12-13 Sept. 1988
The current state-of-the-art is presented both from a theoretical and practical perspective. It covers political, organizational and practical aspects of evaluation projects so that evaluation is seen from its broader contextual location.

How Good is Your Library? : A Review of Approaches to the Evaluation of Library and Information Service
Blagden, J.
Harrington John (Ed.)
Aslib, London, United Kingdom
ISBN 0-85142-268-3; 1990, 64p.

Information in a data collection: models of database and library quality
Losee, R.M., Jr.; School of Information & Library Science, North Carolina Univ., Chapel Hill NC, USA
Journal of the American Society for Information Science, vol.41, no.5, p.359-67 1990; CODEN: AISJB6 ISSN: 0002-8231
The best data collection is the collection containing the greatest amount of information. Several measures of information are described and applied to the measurement of the information content of relations, documents, and books, both singly and in collections. The characteristics of the measures are examined, including the ability of a measure to predict the amount of information that will be available. The methods of counting database or document uses, or treating library circulations as a measure of collection quality, are seen to be consistent with the Bells information measure (41 refs.)

IV. STAFF FOR LIBRARY AND INFORMATION WORK

Future competencies of the information professional
SLA occasional papers series. no. 1
Special Libraries Association, Washington DC, USA
ISBN 0-87111-377-5; 1991, 24p.

Personal Development in Information Work
Webb, S.P.
Aslib, London, UK; ISBN 0-85142-280-2; 1991

Information specialists'use of machine assisted reference tools: evaluation criteria
Beck, S.J.
American Library Assn; RQ, 31(11) Fall 1991, p.35-38
A method is developed of evaluating online searchers. Six criteria are used.

The resources required to run an information service
Müller, J.; Dokumentationszentrum der Bundeswehr, Bonn (West Germany).
Conference paper 07, 18p. In: AGARD Conference Proceedings, Planning and Designing Effective Defence and Related Information Services, Ankara, Turkey, 10-11 Sept. 1986.AGARD-CP-416, 120p.; ISBN-92-835-0417-8; N87-26675. Avail.: NTIS HC A06/MF A01.
Conceptual, manpower, material and financial components are described and discussed as the resources of an information and documentation (I and D) service. The special role of infrastructure is also examined.

V. LIBRARY BUDGET AND ACQUISITIONS

Approval acquisitions and vendor relations: an overview
Bostic, M.J.
Long Island University, Brookly, NY, USA
The Acquistions Librarian, (5) 1991, p.129-144

Approval plans: the multivendor approach
Chalaron, P.; Perrault, A.
Louisiana State University, Baton Rouge, USA
The Acquistions Librarian, (5) 1991, p.145-159.

Guide to Budget Allocation for Information Resources
Shreeves, Edward-Editor
American Library Association, Washington DC, USA
LCCN 91-009371; 1991, 42p.
ISBN 0-8389-3397-1

Raising Money for Academic & Research Libraries: A How-to-Do-It Manual for Librarians
Dewey, Barbara I.
How-to-Do-It Series
Neal-Schuman,
ISBN 1-55570-082-9; 1991, 150p.

Managing the Purchasing Process: A How-to-Do-It Manual for Librarians
Hirshon, A.; Winters, B.A.
How-to-Do-It Series
Neal-Schuman,
ISBN 1-55570-081-0; 1992, 150p.

Operational Costs in Acquisitions
Coffey, J.R. (Editor)
The Acquisitions Librarian Series
Hayworth Publisher,
LCCN 90-049254; 1992, 117p.
ISBN 1-56024-008-3

A guide to centres of international lending and copying
Barwick, M.M.
The Britsh Library, Boston, Spa, United Kingdom
ISBN 0-71232-207-6, 1990

Understanding the Business of Library Acquisitions
Schmidtt, K.A. (Editor)
American Library Association, Washington DC, USA
LCCN 90-033772; 1990,
ISBN 0-8389-0536-6

How to interpret statistical data: a guide for librarians and information scientists
Simpson, I.S.
Library association, London, UK; ISBN 0-85365-729-7; 1990, 78p.

VI. LIBRARY OPERATIONS

List of standards to accompany manual of documentation practices applicable to defence-aerospace scientific and technical information. Addendum
Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France) Technical Information Panel.
AGARD-AG-235-ADD; 1990, 49p.; ISBN-92-835-0583-2; 91N14076 Avail: NTIS HC/MF A03.
This addendum to the Manual of Documentation Practices Applicable to Defence-Aerospace Scientific and Technical Information, originally published in five volumes from 1978 to 1982 (AGARD-AG-235-Vol.I/V), contains lists of standards applicable to information work, grouped by field of application and by nation.

Manual of documentation practices applicable to defence-aerospace scientific and technical information
Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France) Technical Information Panel.
AGARD-AG-235, Vol.I, 64p., 1978, ISBN 92-835-1291-X: 1- acquisition and sources; 2- descriptive cataloguing; 3- abstracting and subject analysis
Vol.II, 121p., 1979, ISBN 92-835-1331-2: 4- data recording and storage; 5- mechanization systems and operations; 6- announcement services and publications.
Vol.III, 192p., 1980, ISBN 92-835-1373-8: 7- information retrieval; 8- dissemination practices; 9- microform systems and reprography
Vol.IV, 124p., 1981, ISBN 92-835-1382-7: 10- security storage and control; 11- organisation and management; 12- networks & external sources of information
Vol.V, 42p., 1982, ISBN 92-835-1414-9: index

Special libraries and information centers:
an introductory text
Mount, E.
Special Libraries Association, Washington DC, USA
ISBN 0-87111-354-6; 1991, 226p.
Description of actual operations within special libraries

Procedures Manual: Defence Research Establishment Suffield Information Services
J. G. Currie ; A. M. Dickason.
Defence Research Establishment Suffield, Ralston, Alberta, Canada
DRES-SP-95, 1988, 57p. AD-A201 127/8/XAD Avail.: NTIS HC A04/MF A01.
Table of Contents: The Reference Library - Introduction; Collection; Selection; Accession List; Weeding; Acquisitions; Cataloguing and Classification; Circulation of Monographs; Periodicals; Interlibrary Loans; Reference; Other Services; The Document Library - Location; Cataloguing; Acquisition; Document Loan Policy; Reference; Keeping Of Statistics; Affiliated Duties.

Behind the Scenes at the Dynamic Library: Simplifying Essential Operations
Fox, B.W.
American Library Association, Washington DC, USA
LCCN 90-031351; 1990, 190p.;ISBN 0-685-38729-1

Serials Management: A Practical Handbook
Buettel, F.; Graham, M.E. (Editor)
Aslib, London, United Kingdom
ISBN 0-85142-239-x; 1990

A Sampler of forms for special libraries
Chapter Social Sciences Group,
Special Libraries Association, Washington DC, USA
ISBN 0-08711-356-2; 1991
Guide to designing forms for all areas of library activities.

Access services ; a handbook
Paietta, A.C.; McFarland & Co., Jefferson NC, USA
Library Association, London, UK; 1991, 208p.
ISBN 0-89950-599-6 ; 1-85604-034-8
Libraries and readers -- Circulation, loans -- Access control -- Security measures -- Open and closed shelves --

Space planning
Freifeld, R.; Masyr, C.
Special Libraries Association, Washington, DC, USA
ISBN 0-87111-356-2; 1991, 150 p.
It is a space saving tool not only for libraries moving to new premises, but also to those wishing to make better use of existing space.

Weeding policy and procedures: Information services
Currie, J.G.; Dickason, A.M.
Defence Research Establishment Suffield, Ralston (Alberta), Canada. (DH544608)
AD-A210568; DRES-SP-128 90N10790; 1989 20p., Avail.: NTIS HC A03/MF A01.
The policy concerning the weeding of material from the DRES libraries is presented. Specific procedures to be followed for the weeding of monographs, periodicals, Sci-Tech reports and government documents are stated. A bibliography is included.

VII. LEGAL AFFAIRS FOR INFORMATION

Intellectual property rights
Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Technical Information Panel.
AGARD-LS-181 ISBN-92-835-0639-1; 235p., 1992.
Presented at Lecture Series, sponsored by AGARD Technical Information Panel and Consultant and Exchange Programme, held in London, United Kingdom, 21-22 Oct. 1991; Brussels, Belgium, 24-25 Oct. 1991; and Arlington, VA, US, 6-7 Nov. 1991
The aim of lecture series is to provide a few markers, to look at the prospects for these trends and to assess the stakes involved, so as to enable better evaluation and control of national and international legal practices. It is thus addressed to decision makers in both the public and private sectors, as well as to the managers of this strategic potential and those involved in the information market.

Intellectual property: a manager's guide
Irish, V.
McGraw-Hill
ISBN 0-07707-356-0, 1991, 209p.
The basics of intellectual property are covered.

Copyright ; interpreting the law for libraries and archives
Graham P. ; Cornish, G.P.
Library Association, London, UK
ISBN 0-85365-709-2; 1990, 114 p.

VIII. DESCRIPTIVE CATALOGUING, INDEXING, ABSTRACTING, SUBJECT ANALYSIS

A proposal for a machine-readable report document page using softstrip
Farquhar, G.
Defence Research Information Centre, Glasgow, United Kingdom.
D/DRIC/12/7/6, 1992, 20p.
DRIC examines the problems in connection with the use of Softstrip as transference tool of bibliographic data contained in the Report Documentation Page from different sources e.g. AGARD, DTIC, DRIC. The feasiblity of use of this tool is demonstrated.

A methodology for writing problem structured abstracts.
Trawinski, B.
Information Processing & Management 25 (6) 1989, p.693-702. 29 refs.
Introduces a methodology for content analysis of scientific documents and for writing problem structured (PS) abstracts. The PS abstract consists of five solution; testing method; related problems; and content elements.
PS abstracts as compared with INSPEC abstracts carry more information about the problem solving process.

Subject analysis
Lancaster, F.W.; Elliker, C.; Harkness Connell, T.; Connell, T. H.
In: M.E. Williams (Editor), Annual Review of Information Science and Technology, Elsevier Science, Amsterdam, The Netherlands, vol. 23, 1989, p.35-84. 267 refs.
Covers: indexing theory and practice; controlled vocabularies (including classification and subject headings); search strategies and searching methods; natural language searching; automatic indexing; and the use of citation relationships in information retrieval.

A microcomputer-based alternative to a printed KWOC index
Brock, J.R.; Atomic Weapons Establishment, Aldermaston, Berkshire, UK
Program, vol.25, no.4, p. 367-72, Oct. 1991, CODEN: PRGMBD ISSN: 0033-0337.
Describes how a printed KWOC index generated on a mainframe computer has been replaced with a database which can be distributed on floppy discs and searched on microcomputers.

Indexing and Abstracting
Müller, J.
Federal Armed Forces Documentation and Information Centre, Bonn, Germany.
Conference paper0 6, 8p. In: AGARD Conference Proceedings, The Organisation and Functions of Documentation and Information Centres in Defence and Aerospace Environments, Athens, Greece, 19-20 Oct. 1988; AGARD-CP-445, 118p.;
ISBN 92-835-0496-8; N89-23362, Avail.: NTIS HC A06/MF A01.

The way a content analysis of documents is made and the application of indexing principles using thesauri are described. In contrast, an abstract is a statement of contents formulated in a natural language; different types of abstracts and abstracting procedures are discussed. It is emphasized that information retrieval is the reverse of the intellectual processes during classifying, indexing and abstracting, and that therefore, the quality of a scientific and technical information systems depends fully on the quality of those intellectual processes.

Retrospective indexing (RI) - A computer-aided indexing technique
Buchan, R.L.
NASA Scientific and Technical Information Facility, Baltimore-Washington International Airport, MD, USA.
Conference paper 6p. 91A29797 In: TKE'90: Terminology and knowledge engineering; Proceedings of the 2nd International Congress, Universität Trier (FRG), 2-4 Oct. 1990. Vol.1. p. 339-344, 11 refs.
INDEKS Verlag, Frankfurt am Main, Federal Republic of Germany, 1990.

An account is given of a method for data base-updating designated 'computer-aided indexing' (CAI) which has been very efficiently implemented at NASA's Scientific and Technical Information Facility by means of retrospective indexing. Novel terms added to the NASA Thesaurus will therefore proceed directly into both the NASA-RECON aerospace information system and its portion of the ESA-Information Retrieval Service, giving users full access to material thus indexed. If a given term appears in the title of a record, it is given special weight. An illustrative graphic representation of the CAI search strategy is presented.

Defense Technical Information Center cataloging guidelines
Defense Technical Information Center (DTIC), Alexandria VA, USA
AD-A211000; 90N10792; DTIC/TR-89/10; 890700 151p.
Avail.: NTIS HC A08/MF A01.

The guidelines for descriptive cataloging is a procedure manual of DTIC. It outlines the cataloging information to be included in the data fields for online input of technical publications. The text is arranged numerically, by field number, and includes appendices with separate sections of special handling and search procedures for duplicate checking. Changes to the security classifications fields have been added to implement DOD 5200.1-R, Information Security Program Regulation. An enhanced version of this guideline for remote input is available as the Shared Bibliographic Input Manual.

Directory of Organizational Technical Report Acronym Codes (DOTRAC) / Annual Report
Becks, V.
Defense Technical Information Center (DTIC), Alexandria VA, USA
AD-A237000; 91N29072; DTIC/TR-91/2; 910600 912p., Avail.: NTIS HC/MF A99.

This compilation is a guide to acronyms as assigned by the DTIC. The listing contains entries from the Department of Defense, Federal Government, foreign military and non-government organizations. The acronyms reflect reports processed into the DTIC collections. The listing is arranged in three parts: acronym, full name of organization, Corporate Author code as used in DTIC.

Source header (Corporate Author code) list.
Volume 1: A through K / Annual Report, Nov. 1989 - Sep. 1990
AD-A231000; 91N21971; DTIC/TR-90/3-VOL-1; 901200; 567p.
Volume 2: L through Z / Annual Report, Nov. 1989 - Sep. 1990
AD-A231001; 91N21972; DTIC/TR-90/3-VOL-2; 901200; 573p.
Brown, L.M.
Defense Technical Information Center (DTIC), Alexandria VA, USA
Avail.: NTIS HC/MF A24.

This publication consists of two volumes of an alphabetically arranged compilation of corporate author names used by DTIC in the DTIC database system.

AGARD guide to aerospace and defence technical report series in NATO countries
Advisory Group for Aerospace Research and Development (AGARD), Neuilly-Sur-Seine (France). Technical Information Panel.
AGARD-R-743-REV; ISBN-92-835-0606-5; 420p. 91N22946 Avail.: NTIS HC/MF A18.
The guide lists reports series from Belgium, Canada, Denmark, Germany, France, Greece, the Netherlands, Norway, Portugal, Spain, United Kingdom, United States, and international organizations. Information given includes a technical report series code, a title (where available), name and address of the organization producing the series, availability (where known), type of organization, and other helpful information provided by the producers.

Standardized bibliographic processing
Richardson, D.I.
Defence Research Establishment Atlantic, Dartmouth, Nova Scotia, Canada; Information Services.
Conference paper 05, 8p. In: AGARD Conference Proceedings, The Organisation and Functions of Documentation and Information Centres in Defence and Aerospace Environments, Athens, Greece, 19-20 Oct. 1988; AGARD-CP-445, 118p.; ISBN 92-835-0496-8; N89-23362, Avail.: NTIS HC A06/MF A01.
An overview is presented of the development of standardized bibliographic processing from the first cataloging rules through to computer exchange formats. The use of these standards by the defence and aerospace community is examined with particular emphasis on the treatment of technical reports.

Energy Data Base: Guide to Abstracting and Indexing.
Raleigh, H.D.
Department of Energy, Oak Ridge, TN. Office of Scientific and Technical Information.*Department of Energy, Washington, DC, USA.
(Portions of this document are illegible in microfiche products).
DOE/TIC-4583-R4, 1987, 137p., DE87009418; Avail.: NTIS HC A07/MF A01.
Three significant components of the document records stored in data bases are abstracts, subject indexing, and subject categories. This Guide contains the guidelines used in abstract writing and editing and in subject indexing and categorizing information for the Office of Scientific and Technical Information (OSTI) databases and publications. The associated acquisition, subject categorization, and retrieval functions are also addressed.

Exchanging bibliographic data ; MARC and other international formats
Gredley, E.; Hopkinson, A.
Ottawa : Canadian Library Association ; London : Library Association ; Chicago : American Library Association, 329 p.; 1990
ISBN 0-88802-258-1 (Canadian Library Association); ISBN 0-85365-899-4 (British Library Association); ISBN 0-83892-151-5 (American Library Association)
Exchange of bibliographic information; Machine-readable bibliographic data; Format; Bibliography, International; Data processing; MARC System

Database design ; an introductory guide to planning and creating a database: a self-study program
Fernald, A.C.
Special Libraries Association, Washington DC, USA
1991, 82 p.

Cataloging and the small special library
Palmer, J.W.
Special Libraries Association, Washington DC, USA
ISBN 0-87111-370-8; 1992

Guidelines for descriptive cataloging of reports: A revision of COSATI standard for descriptive cataloging of government scientific and technical reports
Commerce Energy NASA Defense Information Cataloging Committee, Washington, DC, USA.; AD-A160409; 86N19256; 101p., Avail.: NTIS HC A06/MF A01.
Revised COSATI guidelines developed to maximize standardization of descriptive cataloging entries are defined. The rules presented govern the form of the essential cataloging elements for reports processed by the major federal information processing agencies: U.S. Department of Commerce, U.S. Department of Energy, National Aeronautics and Space Adminstration, and U.S. Department of Defense. The elements are: accession number, organization name, organizational code, title (unclassified), subtitle or descriptive note, personal author, publication date, pagination (for printed documents), funding number, report number, availability, supplementary note, and security classification. Additional elements of information and retrieval such as subject fields and groups, descriptors/subject terms, and abstract are also included within the scope of this standard. The guidelines are intended to provide users with a form of citation and index entries consistent within the products of the various information systems, and to facilitate the exchange of bibliographic information among the federal information processing agencies in the technical report literature field without costly duplicative effort, especially for machine-readable media.

IX. THESAURI

Who needs controlled vocabulary
Fidel, R.
University of Washington
Special Libraries, 83(1) Winter 1992, p.1-9.

NASA Thesaurus supplement: A four part cumulative supplement to the 1988 edition of the NASA Thesaurus (supplement 5) / Semiannual Report
National Aeronautics and Space Administration, Washington, DC. (NC452981)
NASA-SP-7064-SUPPL-5; 91N19962 49p., Avail.: NTIS HC/MF A03.
The four-part cumulative supplement to the 1988 edition of the NASA Thesaurus includes the Hierarchical Listing (Part 1), Access Vocabulary (Part 2), Definitions (Part 3), and Changes (Part 4). The semiannual supplement gives complete hierarchies and accepted upper/lowercase forms for new terms.

NASA thesaurus 1988 edition.
National Aeronautics and Space Administration, Washington, D.C., USA.
It contains nearly 17,000 postable terms and 4,000 nonpostable terms approved for use in the NASA scientific and technical information system. (see volume 1-3)
Volume 1: Hierarchical Listing
NASA-SP-7064-VOL-1; 875p. 89N13302; Avail.: NTIS HC A99.
The broader term and narrower term relationships are shown in an indented fashion that illustrates the generic structure. Related terms are generously applied.
Volume 2: Access vocabulary
NASA-SP-7064-VOL-2; 410p. 89N13298; Avail.: NTIS HC A18.
A permuted index provides access to any word or number in authorized postable and nonpostable terms.
Volume 3: Definitions
NASA-SP-7064-VOL-3; 148p. 89N13301; Avail.: NTIS HC A07.
The definitions given here represent the complete file of over 3,200 definitions, complimented by nearly 1,000 use references.

Defense Technical Information Center Thesaurus
Jacobs, C.R.
Defense Technical Information Center, Alexandria VA, USA
AD-A226000; 91N13370; DTICH-4185.7; 900900; 243p., Avail.: NTIS HC/MF A11.
This DTIC Thesaurus provides a basic multidisciplinary subject term vocabulary used by DTIC to index and retrieve scientific and technical information from its various databases and to aid DTIC's users in their information storage and retrieval operations. It includes an alphabetical Posting term display, a hierarchy display and a keyword-out-of-context (KWOC) display.

Terminology strategies for international information exchange
Cotter, G.A.; Blados, W.R.
Defense Applied Information Technology Center, Alexandria VA, USA
Textsearch Lab.
AD-A214147; 90N15853; DAITC/TR-89/9; DTIC-TR-89/20; 890800; 13p.
Avail.: NTIS HC A03/MF A01.
Development of a common thesaurus for every use by national and international Defense Scientific and Technical Information (STI) organizations to facilitate the exchange of information is described. The concept of a core thesaurus comprising STI terminology which is acceptable to all participants and which can be extended with specific micro vocabularies at the local level to meet specialized needs is explored. The thesaurus will be bilingual with both English and French terminology.

NTIS Subject Classification (Past and Present)
National Technical Information Service, Springfield, Va , USA.
1978, 925p. PB-270575; Avail.: NTIS HC A05/MF A01.
The subject category schemes presented in this report are used by the National Technical Information Service (NTIS) to classify documents for its publications (Weekly Government Abstracts, Government Reports Announcements and Index), its microfiche distribution service (SRIM), and its bibliographic data base.

X. ONLINE SEARCHING: INFORMATION RETRIEVAL, COMPUTER, CD-ROM, GATEWAYS

Planning your technology mix: decision factors that meet user needs
Pagell, R.
University of Pennsylvania, PA, USA
The Elctronic Library, 9(6) Dec. 1991, p.319-324.
Many choices are available for providing information - online, CD-Rom, tapes. Decisions need to be maded as to which combination of technologies to adopt.

New horizons in information retrieval
Ellis, D.
Library Association, London, United Kingdom, 1990, 138p.
Information retrieval; Library science -- Research; Information science

The Online Searcher
Auster, E.(Editor)
Neal-Schuman, ISBN 1-55570-068-3; 1990, 400p.

End-user Searching: Effective Gateway to Published Information
Bysouth, P.T. (Editor)
Aslib, London, United Kingdom; ISBN 0-85142-238-1; 1990, 190p.

Small Project Automation for Libraries & Information Centers
Mandelbaum, J.
Supplements to Computers in Libraries Ser.,; No. 28
Meckler Corp 1992, 350p.; ISBN 0-88736-731-3

Workstations & Local Area Networks for Librarians
Wright, K.C.
American Library Association, Washington DC, USA
1990, 156p.; LCCN 90-000489; ISBN 0-8389-0538-2

Computers in Libraries Buyer's Guide & Consultant Directory, 1991
Brandt, D. S. (Editor)
Meckler Corp., ISBN 0-88736-746-1; 1991, 56p.

Software for information storage and retrieval (ISR) tested, evaluated and compared
Part 1 - General Introduction
Sieverts, E.G.; Hofstede, M.
The Electronic Library 9(3) p.145-154 (June 1991).
A systematic listing and discussion of properties and functions of ISR software is presented.
Part 2 - Classical retrieval systems
Sieverts, E.G.; Hofstede, M.; Haak, P.H.; Nieuwenhuysen, P.; Scheepsma, G.A.Σ.; Veeger, Π.; Vis G.C.
The Electronic Library 9(6) p.301-318 (Dec. 1991).
Nine different programs have been tested and assessed. All of them run under MS-DOS. The test results are tabulated.

The Weapons Laboratory Technical Library: automating with 'STILAS'
Newton, B.I.; Jourdain, J.M.
Weapons Lab., Air Force Syst. Command, Kirtland Air Force Base, NM, USA
Conference paper 08, 8p. In: AGARD, Electronic Transfer of Information and its Impact on Aerospace and Defence Research and Development, Brussels, Belgium, 17-19 Oct. 1989. AGARD-CP-466, 1990, 192p.; ISBN 92-835-0550-6; N90-22440, Avail.: NTIS HC A09/MF A02
Based on the requirement to manage its large diversified collections by automating several functions prototypes known as 'local automation model' were developed. The installation of the first production version of this system renamed as the Scientific and Technical Information Library Automated System (STILAS). STILAS incorporates the features of an integrated library system with gateway reference access to an assortment of remote databases, allowing library staff members and end-users to access up to four database systems simultaneously. In addition STILAS performs all of the traditional library management functions of circulation, serials control, acquisitions, and inventory control. STILAS access is provided to Kirtland Air Force Base and its tenant organizations.

Using dBase: A How to Do It Manual for Microcomputer Information Management in Libraries
Benson, J.A.
How to Do It Manuals for Librarians Series; Neal-Schuman, ;1992,

One Hundred One Microcomputer Projects to Do in Your Library: Putting Your Micro to Work
Dewey, P.
American Library Association, Washington DC, USA
ISBN 0-8389-0518-8; 1990, 176p.

Systems Librarian Guide to Computers
Schuyler, M.
CIL Supplements Series, No. 18; Meckler Corp, 06/
ISBN 0-88736-580-9; 1990, 150p.

Systems Analysis for Library Microcomputer Applications
Kazlauskas, E.J.
Professional Skills Series; Pacific Info, 04/1985, 104p.
ISBN 0-913203-11-4

The Application of Microcomputers to Aerospace and Defence Scientific and Technical Information Work
Advisory Group for Aerospace Research and Development (AGARD), Neuilly-Sur-Seine (France). Technical Information Panel.
AGARD-LS-149; ISBN-92-835-1538-2; AD-A173314; 87N19920; 119p., 1986
Avail.: NTIS HC A06/MF A01.
Lecture series held in London, England, 16-17 Oct. 1986, in Ankara, Turkey, 20-21 Oct. 1986 and in Rome, Italy, 23-24 Oct. 1986
Nine speakers report the growing role of the microcomputer in cataloguing and library housekeeping; in accessing shared information resources through local and wide networks; and in new approaches to information management and retrieval.

Optical Storage Technology 1992: A State of the Art Review
Saffady, W.
Meckler Corp 1992 175p.
ISBN 0-88736-759-3

CD-ROM in Libraries: A Reader
Adkins, S.
Supplements to Computers in Libraries Ser.,; No. 42
Meckler Corp 1992 : 200p.
ISBN 0-88736-800-X

CD-ROM Retrieval Software: An Overview
Morrow, B.V.
Supplement to Computers in Libraries Ser.,; No. 22
Meckler Corp ,1992, 175p.
ISBN 0-88736-667-8

CD-ROM collection builder's toolkit 1992: the definitive reference for CD-ROM buyers
Nichols, P.T.
Eight Bit Books, 1991, 466p.
ISBN 0-910-065021

The life and death of CD-ROM
Bouley, R.J,
CD-ROM Librarian, 7(1) Jan. 1992, p.10,12,14-17

Users, standards and access: in search of the standard user
Stewart, M.R.
General Research Corporation library Systems
CD-ROM Librarian, 7(2) Feb. 1992, p10, 14-17.

NASA gateway requirements analysis
Duncan, D.R.; Doby, J.S.; Shockley, C.W.
National Aeronautics and Space Administration, Washington DC, USA
NASA-TM-104951; 910300; 53p.; 91N22935 Avail.: NTIS HC/MF A04
This report assesses the appropriateness of developing an intelligent gateway interface for the NASA R&D community as a means of obtaining improved access to relevant STI resources outside of NASA's Remote Console (RECON) on-line bibliographic database.

Libraries, Networks, and OSI: a review with a report on North American developments
Dempsey, L.
UK Office for Library Networking, Barth, United Kingdom
ISBN 0-95168-560-0; 1991, 232p.
Meckler Corp 1991 264p.
ISBN 0-88736-818-2
It contains a description of research networks in operation.
lists of acronyms used, relevant standards, and bibliography are included.

Wide-Area Network Applications in Libraries
Zuck, G.; Flanders, B.
Supplement to Computers in Libraries Ser.,; No. 58
Meckler Corp 1992, 165p.
ISBN 0-88736-841-7

Local Area Networks in Libraries
Marks, K.; Nielson, S.
Computers in Libraries Ser.,; No. 27
Meckler Corp 1991 200p.
ISBN 0-88736-705-4

Library LANs (Local-Aerea Networks): Case Studies in Practice & Application
Breeding, M.
Supplements to Computers in Libraries Ser.,; No. 39
Meckler Corp 1992 400p.
ISBN 0-88736-786-0

Expert systems for library and information services - a review
Morris, A.
Loughborough University of Technology, United Kingdom
Information Processing & Management, 27(6) 1991, p.713-724.
Requirements for an ideal system are listed and reference made to over 20 actual systems. Progress towards providing help during the different tasks is reviewed.

Intelligent hypertext systems for aerospace engineering applications
Lo, C.F.
Tennessee Univ. Space Inst., Tullahoma, Tennessee, USA
TABES-PAPER-89-1906 7p., 7refs. IN: Huntsville Association of Technical Societies, Annual Technical and Business Exhibition and Symposium, 5th, Huntsville, AL, May 16-17, 1989.
This paper is a progress report on the utilization of AI technology for assisting users locating and understanding technical information in manuals used for planning and conducting wind tunnel test. The specific goal is to create an Intelligent Hypertext System (IHS) for wind tunnel testing which combines the computerized manual in the form of hypertext and an advisory system that stores experts' knowledge and experiences. A prototype IHS for conducting transonic wind tunnel testing has been constructed with limited knowledge base. The prototype is being evaluated by potential users.

Optical Character Recognition: A Librarian's Guide
Ogg, M.; Ogg, H.
Supplements to Computers in Libraries Ser.,; No.37
Meckler Corp 1992 192p.
ISBN 0-88736-778-X

XI. SECURITY

Information policy, national security, and the Reagan administration.
Relyea, H.C.
Government Information Quarterly, 6 (4) 1989, p.365-382. 97 refs
In formulating its information policies, the Reagan administration sought not only to realise effective safeguards against Soviet intelligence and espoinage efforts, but also to return the USA to a position of military strength. Consequently, both American domestic and foreign policy became permeated by a more strident anti-communist attitude, manifesting itself in enforcement of laws restricting the availability of information and goods of possible benefit to hostile nations, and pursuit of new authority for more strictly controlling the acquisition of American scientific and technological knowledge and commodities by foreign interests.

The amount of classified information: causes, consequences, and correctives of a growing concern.
Kaiser, F.M.
Government Information Quarterly, 6 (3) 1989, p.247-266. table. 60 refs
The inherent tension betwen official secrecy and democracy has been magnified by the continually growing amount of classified national security information. Not only has it increased at a rapid rate during the Reagan administration, but the rise also appears to be disproportionately large for the most highly protected categories of such information, such as military special access programs. Explores the major causes underlying this state of affairs, examining both recent and perennial tendencies.

The right to know: public access to federal information in the 1980s.
Shattuck, J.
Government Information Quarterly, 5 (4) 1988, p.369-375. 5 refs.
Examines government information controls in the context of the constitutional and statutory tradition of open access to government information in the USA. Discusses the restrictive climate in which the Reagan administration views public access and warns that restrictive national security policies may actually curtail economic growth, retard defence programmes, and undermine the Constitution.

H.R. 145, the computer security act of 1987: an assessment
Blake, V.
In: M.E. Williams; T.H. Hogan, National Online Meeting-1988: Proceedings of the 9th National Online Meeting, New York NY, USA, 10-12 May 1988.
Learned Information Inc., Medford, New Jersey, USA, 1988, p.27-36. 31 refs
In 1986 the existence of the National Policy on Protection of Sensitive but Unclassified Information in Federal Government Telecommunications and Automated Information Systems was revealed. This policy sought to extend the Federal government's authority to control access to unclassified information in computer and telecommunications systems within the Federal government and the private sector. This policy, also known as NTISSP No. 2, was the immediate catalyst for the introduction of the Computer Security Act of 1987, H.R. 145. This bill's objective was to offset the perceived threats to free access to unclassified information held by government agencies and made available by private operated on-line information services. Specifically it was viewed as the vehicle to: remove the potential authority of military and intelligence agencies to control access to unclassified information; eliminate a new category of information; and restrict the government's authority to secure unclassified information to government computer and telecommunication systems

XII. INFORMATION SOURCES

A Reference Tool for users of the NTIS Bibliographic Database
Kane, A.; Harrison, A.
National Technical Information Service, Springfield, Va., USA
NTIS-PR-0253, 1986, 29p.
The purpose of this guide is to provide background material on the database. The major part of this guide is a description of the contents of the data fields which form the bibliographic citations contained in the database. A section contains hinats on on-line , and other sections present a list of the thesauri used to index reports contained in the data base, the subject classification schemes , and the five common formats of an NTIS citation.

How to find information in science and technology
Lambert, J.; Lambert, P.
Library Association, London UK
ISBN 0-85157-469; 1991, 108p.

Referral database directory
Jacobson, C.E.; Bixby, R.L.
Defense Technical Information Center, Alexandria, VA. USA
AD-A241750; 92N13892; DTIC/TR-91/3 911000 611p. Revised
Avail.: NTIS HC/MF A99.
This directory contains a listing of specialized scientific and technical information sources operated or supported by the Department of Defense (DoD) or other Federal agencies. Arrangement is numerical by referral number with three indices: Referral name, Points-of-contact, and Subject. There is also a listing of DoD information analysis centers. Each referral shows pertinent information on its mission, special subject areas, availability of material,

How to get it: A guide to defense-related information resources
Schlag, G.A.; Reed, C.E.
Defense Technical Information Center, Alexandria VA, USA
AD-A201600; 90N22433; DTIC/TR-89/1; IDA-PAPER-P-1500; 890100; 626p.
Avail.: NTIS HC A99/MF A04.
A reference tool to identify and/or acquire government published or sponsored documents, maps, patents, specifications or standards and other resources of interest to the defense community is presented. Entries are arranged alphabetically in a single dictionary listing, by document type, source, acronym, series designation, or short title. Each entry consists of identification of the item and detailed acquisition information such as source, order forms necessary, if there is a cost, where it is indexed, and telephone numbers for additional information. A detailed introduction, glossary and bibliography are included.

Scientific and Technical Information Network (STINET) and DOD Gateway Information System (DGIS): Reference publications bibliography
Kuhn, A.D.
Defense Applied Information Technology Center, Alexandria VA, USA
Hypermedia Lab.
AD-A203926; 89N21704; DAITC/TR-88/011; DTIC/TR-89/6 881200 16p.
Avail.: NTIS HC A03/MF A01.

This bibliography lists publications resulting from the efforts of the Scientific and Technical Information Network (STINET) program of the Defense Technical Information Center (DTIC). STINET is the logical outgrowth of the information networking activities of the DOD Gateway Information System (DGIS). STINET is more comprehensive in that it is the amalgamation and coalescence of many efforts, all reflected in this bibliography. Additional references to publications from outside organizations are included, as having direct bearing or influence on STINET development programs. The bibliography was begun in October 1985, contains about 85 references and goes through to the end of December 1988.

Defense technical information center's role in numeric database development
Haller, H.B.
Defense Technical Information Center, Alexandria VA,USA
Office of Information Systems and Technology.
AD-A202901; 89N21701; DTIC/TR-88/14 880800 17p.
Avail.: NTIS HC A03/MF A01.

Computers have changed the way we handle and distribute numeric data. Computers provide available information, quickly and with various data manipulations for analyses, calculations and evaluations. DTIC has a role to play in developing numeric databases because these new resources are causing DTIC's users' needs to change. DTIC 2000, the program plan, justifies DTIC's participation in numeric database efforts. Traditional bibliographic resources that DTIC provides will no longer suffice because of the advent of computers. Numeric databases provide end users the data itself, not just pointers. Also, DTIC users will be changing because more end users will do their own searches of numeric databases. Intermediary responsibilities will increase because they will assist end users.

Evaluation of the high temperature materials information analysis center online numeric database
Haller, H.B.
Defense Technical Information Center, Alexandria VA, USA
Office of Information Systems and Technology.
AD-A202900; 89N21700; DTIC/TR-88/13; 880600; 245p.
Avail.: NTIS HC A11/MF A01.

High Temperature Materials Information Analysis Center (HTMIAC) operated by Purdue Univ. under the direction of Dr. C. Y. Ho, requested funds from the Defense Technical Information Center (DTIC) for fiscal year 1988. HTMIAC wanted to convert their high temperature materials numeric data to an online system. Their intention was for DTIC to fund putting the data online, and for the user community to fund maintaining the data online. DTIC agreed to the arrangement for several reasons. High temperature materials data users are also DTIC users and DTIC had never been involved in a numeric database development effort.

Sources of information
Zijlstra, B. H. A.
Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, The Hague, The Netherlands.
Conference paper 04, 14p. In: AGARD Conference Proceedings, The Organisation and Functions of Documentation and Information Centres in Defence and Aerospace Environments, Athens, Greece, 19-20 Oct. 1988; AGARD-CP-445, 118p.;
ISBN 92-835-0496-8; N89-23362, Avail.: NTIS HC A06/MF A01.

The Scientific and Technical Documentation and Information Centre of the Armed Forces (TDCK) publishes monthly abstract bulletins concerning 15 subject areas. Details are given about the information sources from which the reports and articles are selected. Attention is given to other information sources such as standards, manuals, loose leaf publications, videotapes, and to information guides and registries.

Academic library use of NTIS (National Technical Information Service): Suggestions for services and core collections
McClure, C.R.; Hernon, P.
Syracuse Univ., NY, USA
Sponsored by NTIS Prepared in cooperation with Simmons Coll., Boston, Mass.
PB86-228871; ISBN-0-934213-04-6 87N19143, 70p., Avail.: NTIS HC A04/MF A01.
NTIS offers a diverse range of important information resources for the physical, social, behavioral, and life sciences. The manual is intended to assist academic librarians, and other information professionals, in better exploiting these information resources available through NTIS. It offers a number of practical suggestions and strategies for making NTIS information services and products available through academic libraries. The role of academic librarians in assisting the academic community with access to NTIS resources should be a natural and positive one. Both NTIS and the academic library community can work together and increase the range of valuable information resources available to faculty, students, and other clientele served by college and university libraries.

The patent document - An underestimated information vehicle
Zeri, A.; European Patent Office, The Hague, Netherlands
Preprint 23p. 90A42444 In: Associazione Industrie Aerospaziali and Associazione Italiana di Aeronautica ed Astronautica, European Rotorcraft Forum, 14th, Milan, Italy, Sept. 20-23, 1988.
When the designer is solving a technical problem, such as countering the torque of the main rotor of a single-rotor helicopter, an important resource is the ready access to the bulk of technical information available relevant to the subject under study. It is noted that the information of the different sources offered to the designer, that of patent documents are the most important source in avoiding duplication of work.

Patents: a valuable resource in the information age
Wu, C.; Calhoun, E.
Rutgers University, New Jersey, USA
Special Libraries, 83(1) Winter 1992, p.16-25.

The European Patent Office and its patent information policy
Giroud, G.
European Patent Offic, The Hague, The Netherlands
The Electronic Library, 9(6) Dec. 1991, p.329-332.

How an engineer acquires and uses information through the DIALOG system
Zarchan, P.; Charles Stark Draper Laboratory, Inc., Cambridge, MA, USA
AIAA-PAPER 89-851, 9p., 89A25620; American Institute Aersonautics & Astronautics, New York NY, USA, Aerospace Sciences Meeting, 27th, Reno, NV, Jan.9-12, 1989.
The use of the DIALOG Information Retrieval Service in the daily work of an aerospace engineer is discussed. Consideration is given to the technical aspects and cost of using the system. The various types of data bases included in the DIALOG system are discussed, focusing on data bases which are useful to engineers. Sample searches using the Aerospace DataBase are presented to illustrate the operation of research oriented data bases. Examples are given for other DIALOG data bases which provide national, international, business, and technological news. Other examples using the DIALOG system include searching resumes when recruiting new employees and obtaining information on the research and business activities of prominent persons. It is concluded that operation of the DIALOG system on a daily basis provides an extensive amount of information pertinent to engineers.

Technology advances for information access - Prospects and impact
Summit, R.K.; Dialog Information Services, Inc., Palo Alto, CA, USA
AIAA-PAPER 89-849, 8p. 9refs., 89A25618; American Institute of Aeronautics & Astronautics, New York NY, Aerospace Sciences Meeting, 27th, Reno NV, USA, Jan.9-12, 1989.
This paper traces the history of online information retrieval, with emphasis on the manner in which technological advances stimulated the development of the online industry in general, and the DIALOG Information Retrieval Service in particular. The current technology employed by Dialog is examined, as are applications of that technology to information searching in the aerospace/defense industry. Continuing progress in online and CDROM (Compact Disk, Read Only Memory) information technology is reviewed,

Telling the user what is available: Announcement and search
Adams, C. D.
Defence Research Information Centre, Glasgow (Scotland) UK
Conference paper 10, 8p.
In: AGARD Conference Proceedings, Planning and Designing Effective Defence and Related Information Services, Ankara, Turkey, 10-11 Sept. 1986.
AGARD-CP-416, 120p.; ISBN-92-835-0417-8; N87-26675. Avail.: NTIS HC A06/MF A01.

The various means by which an information service can make users aware of documents which are available are discussed. Regular announcement of document holdings and searches of document holdings in response to specific inquiries are discussed. The various types of current awareness and search service are described and are illustrated by reference to the Defense Research Information Center (DRIC) which provides these services to the United Kingdom defense community.

Fostering interaction of government, defense, and aerospace databases
Hampel, V.E.; Defense Applied Information Technology Center, Alexandria VA, USA.
Conference paper 12, 20p. In: AGARD Conference Proceedings, The Organisation and Functions of Documentation and Information Centres in Defence and Aerospace Environments, Athens, Greece, 19-20 Oct. 1988; AGARD-CP-445, 118p.;
ISBN 92-835-0496-8; N89-23362, Avail.: NTIS HC A06/MF A01.

The Department of Defense (DOD) knowledge worker needs rapid access to select information contained in government, defense, and aerospace databases. In the United States, information of use to defense and aerospace specialists are contained in multiple government databases as well as in commercial databases. Policy and technology strategies are addressed, which are being developed by the Defense Technical Information Center (DTIC) to foster better interaction among government, defense, and aerospace databases.

The NASA master directory quick reference guide
NASA Goddard Space Flight Center, Greenbelt MD, USA
Conference paper 7p.
In: its Proceedings of the Second Annual NASA Science Internet User Working Group Conference, p.394-400; N91-27009, Avail.: NTIS HC/MF A19.

The NASA Master Directory (MD) is a free, online, multidisciplinary directory of space and Earth science data sets (NASA and non-NASA data) that are of potential interest to the NASA-sponsored research community. The MD contains high-level descriptions of data sets, other data systems and archives, and campaigns and projects. It provides mechanisms for searching for data sets by important criteria such as geophysical parameters, time, and spatial coverage. The MD provides automatic connections to a number of data systems such as the NASA Climate Data System, the Planetary Data System, the NASA Ocean Data System, the Pilot Land Data System, and others. The MD also provides general information about many data systems, data centers, and coordinated data analysis projects. It represents the first major step in the Catalog Interoperability project, whose objective is to enable researchers to quickly and efficiently identity, obtain information about, and get access to space and Earth science data.

Proceedings of the Second International Workshop on the European Aerospace Database (EAD), Frascati, Italy, 21-22 May 1990
European Space Agency.
ESA-WPP-18, 105p., Avail.: ESA-IRS, Frascati, Italy

Various aspects of the European Aerospace Database (EAD) are discussed. Development aspects are described. Control procedures concerning release of industry documents are outlined. ESA's policy regarding information and data is presented. The EAD input/validation system is described. The data dissemination network in support of EAD is discussed. Business information services offered to the European aerospace community are described. The ESA electronic system for distribution of tender actions is described.

Kinds of access to unclassified literature
Auger, C.P.
Lucas Group Services Ltd., Solihull, United Kingdom
Conference paper 07, 4p., 80N32290
In: AGARD Conference Proceedings, International Access to Aerospace Information, Athens, Greece, 17-18 Oct. 1979; AGARD-CP-279, 106p., ISBN92-835-0264-7; N80-32283, Avail.: NTIS HC A06/MF A01.
The nature of unclassified literature is reviewed and the categories available and their organization are examined. The preponderance of reports literature is noted and current awareness and on line services receive particular attention. Consideration is given to the great variety of users seeking access for one reason or another and the different routes open to them. Finally attention is turned to some of the problems which need to be overcome if access is to be improved.

Use of reports literature
Auger, C.P.
Butterworths, London, United Kingdom
ISBN 0-408-70666-X, 1975, 226p.
It reviews the nature and development of reports literature, its collections and methods of acquisition, bibliographical control, cataloguing and indexing, report writing, theses, translations and preprints, microforms.
Part II deals with specific subject areas: Aerospace, agricultlure and food, biology and medicine, businees and education, nuclear energy.

Geologists and gray literature: access use and problems
Science & Technology Libraries, 11(3) Spring 1991, p.39-50
Problems of physical quality, bibliographic control, access and acquisition.

REPORT DOCUMENTATION PAGE

1. Recipient's Reference	2. Originator's Reference	3. Further Reference	4. Security Classification of Document
	AGARD-R-788	ISBN 92-835-0681-2	UNCLASSIFIED

5. Originator	Advisory Group for Aerospace Research and Development North Atlantic Treaty Organization 7 rue Ancelle, 92200 Neuilly sur Seine, France
6. Title	SEMINAR ON BASIC DOCUMENTATION PRACTICES
7. Presented on	3rd—4th September 1992 in Ankara, Turkey, 7th—8th September 1992 in Athens, Greece and 10th—11th September 1992 in Lisbon, Portugal.

8. Author(s)/Editor(s)	9. Date
Various	August 1992
10. Author's/Editor's Address	**11. Pages**
Various	196

12. Distribution Statement This document is distributed in accordance with AGARD policies and regulations, which are outlined on the back covers of all AGARD publications.

13. Keywords/Descriptors

Documentation	Library science
Information systems	Document acquisition
Information retrieval	Information technology

14. Abstract

Application of new technology to the management of scientific and technical information relies upon a thorough grounding in basic concepts. The acquisition, storage, retrieval and dissemination of material is becoming ever more complex and is a process which requires an understanding of how knowledge is perceived by the end user, the mechanics of data transfer and the principles of responsible information exchange. In addition, the proliferation of information and the variety of media currently available make clear objectives and practical solutions essential.

The AGARD Technical Information Panel (TIP) has produced a number of publications aimed at establishing, and raising the standard of, information management. This Seminar brings together expert speakers to update the information in these publications and to contribute towards the further improvement in basic documentation practices.

This Seminar, sponsored by the Technical Information Panel of AGARD, has been implemented by the Consultant and Exchange Programme.

AGARD Report 788 Advisory Group for Aerospace Research and Development, NATO BASIC DOCUMENTATION PRACTICES Published August 1992 196 pages Application of new technology to the management of scientific and technical information relies upon a thorough grounding in basic concepts. The acquisition, storage, retrieval and dissemination of material is becoming ever more complex and is a process which requires an understanding of how knowledge is perceived by the end user, the mechanics of data transfer and the principles of responsible information exchange. In addition, the proliferation of information and the variety of media P.T.O.	AGARD-R-788 Documentation Information systems Information retrieval Library science Document acquisition Information technology	AGARD Report 788 Advisory Group for Aerospace Research and Development, NATO BASIC DOCUMENTATION PRACTICES Published August 1992 196 pages Application of new technology to the management of scientific and technical information relies upon a thorough grounding in basic concepts. The acquisition, storage, retrieval and dissemination of material is becoming ever more complex and is a process which requires an understanding of how knowledge is perceived by the end user, the mechanics of data transfer and the principles of responsible information exchange. In addition, the proliferation of information and the variety of media P.T.O.	AGARD-R-788 Documentation Information systems Information retrieval Library science Document acquisition Information technology
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ISBN 92-835-0681-2

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