Evaluation of the EI reference desk : a multifunction workstation

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Price, Sandra P.. 2019. "Evaluation of the EI Reference Desk : A Multifunction Workstation". figshare. https://hdl.handle.net/2134/14404.

EVALUATION OF THE EI REFERENCE DESK: A MULTIFUNCTION WORKSTATION FOR THE PROVISION OF ENGINEERING INFORMATION

by

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A MASTER'S THESIS

SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF

MASTER OF PHILOSOPHY OF LOUGHBOROUGH UNIVERSITY OF
TECHNOLOGY.

MAY 1994

ABSTRACT

This thesis describes an investigation undertaken at Loughborough University of Technology in conjunction with the British Library Document Supply Centre. The overall aim of this research was to investigate and evaluate the operation and use of the Ei Reference Desk, an integrated engineering information workstation developed by Engineering Information Inc.. In addition to adding to the basic knowledge on systems for information retrieval and dissemination, improvements to the Ei Reference Desk and related systems were also identified.

The research comprised: production of instructional documentation for the workstation; literature review; testing the workstation using evaluative research in the form of questionnaires; comparison studies; and statistical analysis of results using SPSS-X.

The literature review concentrated on the following: Engineering Information Inc., workstations, document delivery, telecommunications, and end-user searching. Two questionnaires were designed: the first questionnaire was for test group members using the full workstation facilities over a five month test period; and the second questionnaire was for general library users using the workstation on an ad hoc basis throughout the year. The main objectives of the comparison studies were to compare the printed and electronic sources available to the researcher, and highlight some of the advantages and disadvantages associated with the various retrieval methods. A comparison was also made between the search results retrieved by both the intermediary/librarian and the researcher/end-user.

The conclusions and recommendations draw together the main findings of the research, and have been presented to reflect the: optimal operation for different user groups and functions; impact upon the end-users and institution; value for managing information; suitability and clarity of the user interface; technical robustness and flexibility; and effectiveness of the document delivery options.

Overall, the Ei Reference Desk provided end-users with valuable access to engineering literature. Recommendations for future development work include: improved integration of modules and user interfaces; access to other software packages; an easy to use and reliable order module; ability to link into existing document supply services and communication networks; further developments in electronic document delivery; and the integration of on-site library holding records.

ACKNOWLEDGEMENTS

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ABBREVIATIONS

ADONIS	-	Article Delivery Over Network Information Systems
APOLLO	-	Article Procurement with On-Line Local Ordering
ARTEMIS	-	Automatic Retrieval of Text from Europe's Multinational Information Service
ARTTel	-	Automated Request Transmission by Telephone
ASME	-	American Society of Mechanical Engineers
Baud rate	-	The number of times per second that a system, especially a data transmission channel, changes state
BIDS	-	Bath Information and Data Services (Citation Indexes)
Bit	-	Binary digit
Bit-map	-	A series of black and white dots normally known as pixels
BLDSC	-	British Library Document Supply Centre
BLEND	-	Birmingham and Loughborough Electronic Network Development
BLRDD	-	British Library Research and Development Department
Bps	-	Bits per second
Bytes	-	A byte is the amount of memory space needed to store one character, which is normally 8 bits
CAD	-	Computer Aided Design
CAM	-	Computer Aided Manufacturing
CARL	-	Colorado Alliance of Research Libraries
CCITT	-	Comite Consultatif Internationale Telegraphique et Telephonique
CD-ROM	-	Compact Disc - Read Only Memory
CEC	-	Commission of the European Communities
CEPT	-	Conference Europeene des administration des Postes et Telecommunications
Chem Disc	-	A discipline specific subset of Compendex Plus
CITED	-	Copyright in Transmitted Electronic Documents
Compendex Plus	-	Engineering Index and conference proceedings produced by Dialog (database).
CWS	-	Clinical Workstation at the John Hopkins University
Dialog	-	An online information retrieval service operated in the

		USA by Lockheed Missiles and Space Company Inc.
DIANE	-	Direct Information Access Network for Europe
DocDel	-	Electronic Document Delivery and electronic publishing
DOS	-	Disk Operating System
Dpi	-	Dots per inch
DTI	-	Department of Trade and Industry
ECS	-	European Communications Satellite
EDDS	-	Electronic Document Delivery Service
Ei	-	Engineering Information Inc.
E-Mail	-	Electronic Mail
ESA	-	European Space Agency
EUTELSAT	-	European Telecommunications Satellite Organisation
GEDI	-	Group on Electronic Document Interchange
GNS	-	Global Network Services
IAIMS	-	Integrated Academic Information Management System Workstation at John Hopkins University
IDA	-	Integrated Digital Access
Internet	-	A telecommunications network
ISDN	-	Integrated Services Digital Network
ISI	-	Institute for Scientific Information
IT	-	Information Technology
IWS	-	Integrated Workstation developed by Leicester Polytechnic and Dawsons Technology
JANET	-	Joint Academic Network
LAR	-	Local Area Network
LUT	-	Loughborough University of Technology
Megabyte	-	One megabyte can store more than 1 million characters (1,048,576 bytes)
NAL	-	National Agricultural Library
NATDP	-	National Agricultural Text Digitizing Project
NCSUL	-	North Carolina State University Libraries
NLM	-	National Library of Medicine, Bethesda.
OCLC	-	Online Computer Library Centre Inc.
OPAC	-	Online Public Access Catalogue
OSU	-	Ohio State University

Page One	-	A table of contents service produced by Engineering Index
PC	-	Personal Computer
PSS	-	Packet Switching Service (Service of BT)
PTT	-	Post, Telegraph and Telephone Administration
RLG	-	Research Libraries Group (United States)
SPSS-X	-	Statistical Package for the Social Sciences
UMI	-	University Microfilms
WAN	-	Wide Area Network
WTI	-	World Translation Index

CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

1.1 Introduction to subject matter

Libraries play an important role in satisfying the information needs of academics and students. Over the last few years, there has been a substantial growth in student numbers, rapid inflation in the costs of printed materials and new costs generated by information technology. Within this rapidly changing environment, libraries and institutions are under increasing financial pressure, and at the same time have to face up to the challenges and opportunities associated with new technological developments.

In response to some of these issues, the Libraries Review Group was established under the chairmanship of Sir Brian Follet (Joint Funding Councils 1993). This review of library and related provision in higher education in the United Kingdom was commissioned jointly by the Higher Education Funding Councils of England, Wales, Scotland, and the Department of Education for Northern Ireland. The Follet Report includes many recommendations, amongst which it highlights the fact that developments in information technology, and other changes affecting information provision, have created the need for institutions to: reassess the position and function of both libraries and librarians; clarify their objectives; and allocate appropriate resources to enable these to be met.

Information is already available through many different types of media. The view of the library as the single repository of information is no longer adequate, but the emphasis is moving towards information and information access. The increased understanding, by both academics and students, of computer technology and the availability of electronic information sources has consequently raised their expectations of information provision.

1.2 Justification

During the current economic climate, financial pressures have affected all sectors. One of the greatest pressures on academic libraries has been the rapid rise in serial subscription rates well above inflation. Most libraries are now taking part in serial review or cancellation exercises, but are under constant pressure to maintain journal

provision in order to satisfy academics' requirements. At the same time, it appears that academics, especially students, generally require specific articles from a wide variety of titles, rather than a complete run of a particular journal (Leach and Tribble 1993). A strong argument therefore exists for the provision of individual articles as opposed to a substantial journal collection building policy, so long as they can be provided cost effectively.

There have been rapid changes in the type, format, and number of information sources made available over the last few years. With the developments in networking, information sources are no longer simply available at a local level but are also available world-wide. These new information sources have many implications for libraries, including: financial, selection of appropriate databases, user instruction, suitability for end-users, and systems support. End-users currently face a multitude of different means of obtaining information to satisfy their individual needs. Electronic information retrieval systems, including the advent of CD-ROM and the networking of services, will play an important part in any future system developments. These facilities open up greater opportunities and may facilitate, amongst others, end-user searching and the possibilities of a 'one stop information workstation', where the user can identify, locate and retrieve information from a wide variety of sources through a single workstation.

Harer (1992, p.79) discussed a process referred to as the *"Information Cycle Network"*. The process comprises three components:

- Identification: Searching for information and identifying a source.
- Access: Determining availability and location of material.
- Delivery: Receiving the actual information.

The cycle may be completed, but when the retrieved source points to more information, the process starts again. In an ideal environment, the researcher should be able to perform all of these functions at a single workstation. Some institutions are now providing access to certain types of information sources, but the third component in the cycle (i.e. delivery) is not always available. A situation has thus been created where there is rapid access to a large amount of electronic bibliographic information that can be used to check holdings of material and electronic ordering facilities. However, the delivery of material has often been extremely time consuming, and an ever increasing source of end-user frustration. The Ei Reference Desk may help to solve this particular problem.

1.3 Aims and objectives

The overall aim of this research was to investigate and evaluate the operation and use of a multifunction engineering information workstation (i.e. the Ei Reference Desk) in an environment where there was already an established information service to relatively sophisticated users. In addition to adding to the basic knowledge on systems for information retrieval and dissemination, improvements to the Ei Reference Desk and related systems were to be identified. The following aspects of the workstation were distinguished as key areas to be studied during this research:

- optimal operation for various user groups and functions;
- impact upon end-users and the institution;
- value for managing information;
- suitability and clarity of the user interface;
- technical robustness and flexibility; and
- effectiveness of document delivery options.

In order to achieve the main aim of this research, it was also necessary to perform several comparison studies between the Ei Reference Desk facilities, the print version of Engineering Index, and online Compendex Plus. The main objectives of this part of the research were to compare the printed and electronic sources available to the researcher, and highlight some of the advantages and disadvantages associated with the various retrieval methods. A comparison was also made between the search results retrieved by both the intermediary/librarian and the researcher/end-user.

1.4 Research methodology

The research began in August 1991, and the immediate priority was to organise additional instructional documentation for the equipment and packages. At this time the Ei user's guide was still in its draft stage (Engineering Information Inc. 1991). The first part of the research also involved a literature review of previous research relating to the following subjects:

- Engineering Information Inc.;
- Workstations;
- Document delivery;
- Telecommunications; and
- End-user searching.

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The Ei Reference Desk was tested using evaluative research in the form of questionnaires. Although it was initially intended to only use a questionnaire approach with a test group of academics, the workstation created considerable interest amongst general library users, and it was considered that they would also provide useful feedback on the database search facilities. Consequently, two questionnaires were designed: the first questionnaire was for test group members using the full workstation facilities over a five month test period; and the second questionnaire was for general library users using the workstation on an ad hoc basis throughout the year.

In order to supplement the results of the questionnaire analysis, comparison studies were also undertaken. The studies involved eight searches performed by Ei Reference Desk users. These searches were repeated using other retrieval options from Engineering Information Inc. (i.e. the same commercial source).

The system was investigated within the Pilkington Library and not in a controlled environment, therefore, all categories of the University's population had access to the workstation within a working environment. The workstation was developed by Engineering Information Inc., and its document delivery aspects were investigated in collaboration with the British Library Document Supply Centre.

1.5   Organisation of the thesis

Chapter one introduces the research presented in this thesis and summarises the main findings. A literature review of previous work and recent developments has been presented in Chapter two. A detailed description of the Ei Reference Desk has been presented in Chapter three, along with equipment specifications, coverage of databases, and other workstation facilities. Research methodology has been expanded upon in Chapter four, which outlines various sampling techniques, questionnaire design and analysis, and equipment set-up. A comprehensive analysis of questionnaire results has been presented and discussed in Chapter five. Observations concerning equipment and database performance were recorded throughout the test period. These observations have been used in Chapter six to highlight the strengths and weaknesses associated with the workstation. Chapter seven focuses on comparisons made between electronic sources available via the workstation and Engineering Index (an equivalent printed source). Conclusions, recommendations and future developments have been presented in Chapters eight and

nine. The appendices to this thesis include: Ei Reference Desk instructional documentation produced at the start of this research; questionnaires used to evaluate the workstation; and end-user comments.

CHAPTER TWO

REVIEW OF PREVIOUS WORK

2.0   REVIEW OF PREVIOUS WORK

2.1   Introduction

The following is a selective literature review of published material relating to the current research theme. The review is split into the following five areas:

- Engineering Information Inc.:- Outlines the history behind the producers of the workstation under investigation.

- Workstations:- Includes definitions and details of projects relating to information based multifunction workstations.

- Document delivery:- Reviews research projects involving different forms of electronic document delivery and storage.

- Telecommunications:- Includes recent research and developments.

- End-user searching:- Highlights a number of studies into end-user searching of electronic bibliographic databases.

2.2   Engineering Information Inc.

The origin of Engineering Information Inc. (Ei) can be traced back to Dr John Butler Johnson, a Professor of Civil Engineering at Washington University (Landau 1984). In 1883, he became concerned with the lack of access to literature in the engineering field, and subsequently compiled a collection of document citations and abstracts which he called 'Index Notes'. In 1884, the index notes were published in the Journal of the Association of Engineering Societies. Eleven years later, the Engineering Magazine of New York purchased the publishing rights to the index, and introduced the title 'The Engineering Index'. The American Society of Mechanical Engineers (ASME) published Engineering Index from 1919 to 1934, when the non-profit corporation 'Engineering Index Inc.' was formed. At the same time, a co-operative arrangement was established with the engineering societies library, whereby Engineering Index would index all key journals in the library's collection. In 1969, the ASME assigned the trademark and copyright to Engineering Index Inc.. The

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corporation changed its name in 1981 to 'Engineering Information Inc.' to better reflect its role as a *"broad-based information product and service supplier and co-ordinator"* (Landau 1984, p. 313). Ei currently provides access to literature from all engineering disciplines.

2.3   Workstations

2.3.1   Introduction to workstations

A workstation is described by the Oxford Dictionary of Computing (1991, p. 504) as *"a position for an operator that is equipped with all of the facilities required to perform a particular type of task"*.

The term 'workstation' has been applied to everything from a mainframe terminal to a stand alone microcomputer. Within the library environment, workstations have been further defined by the tasks they perform. Beecher (1991, p. 52) divided these tasks into two categories: *"workstations designed to be used primarily by library staff carrying out such procedures as cataloguing and circulating materials, and workstations intended for direct use by library patrons"*. The first category includes personal computers used for library cataloguing and circulation procedures. The second category (i.e. 'public access workstations') contains a variety of systems including online public access catalogues and database search systems. Beecher also identified the following set of criteria required for the ideal library workstation.

- Standard hardware;
- Open-design software (programs that can be used alongside, or interact with others);
- Customisation options (options for customising functions);
- Scalable interfaces (user presented with a menu of different operating levels);
- Connectivity (access to mainframe resources, CD-ROMs, modems, etc.).

New technology is providing both more sophisticated delivery systems and advanced workstations equipped with CD-ROM drives, jukeboxes and article fax capabilities. The Ei Reference Desk, designed by Ei Information Inc., aims to provide access to full-text documents via a single workstation, and comprises integrated software and services from which users can select one or more functions from a single menu.

2.3.2 The Scholar's Workstation

In 1983, at Brown University, Providence, Rhode Island, United States, the 'Scholar's Workstation' project began. The aim of the project was to *"experiment with shape, and evaluate new types of computer and communication tools that might have a profound effect on future education and scholarship"* (Moran, Surprenant and Taylor 1987, p. 6). The project aimed to expand and integrate the university's computing, communication, and information systems. Originally, it was envisioned that 2,000 workstations would be in use by the end of 1984, and 10,000 by 1987. However, by 1986 the workstations were not operational, although a campus network had been installed (Shipp, Meyrowitz and Van Dam 1983). Communication problems occurred between the people in charge of the project and the rest of the University community. There had been gross underestimates of the time and costs involved in making the project operational. Brown University decided not to use 'off the shelf' products, but to produce its own with a corporate partner incurring additional time and money. Consequently, expectations were raised to a level that could not be satisfied within the given budget and time frame.

2.3.3 The Sun Workstation

In 1987, Shell Research Ltd decided to integrate the activities of their Library and Information Group, based at the Thornton Research Centre, with their Office Systems and Report Production Group (Dodd 1990). The aim of the new group, i.e. the 'Information and Reporting Services Group', was to handle all of the activities within the information chain. The Centre used Sun workstations for computer graphics, electronic publishing and information processing, and had a hypertext guide to the Information and Computing Department. A scientist at Shell Research Ltd could search the in-house database for reports using standard retrieval methods, and display a list of reports with bibliographic details. Appropriate reports could be selected from the title list. By accessing the read only segment of the full-text database, the scientist could pull out the required text, and copy it into his/her own workspace. The text was then manipulated by the scientist into other formats.

2.3.4 The Knowledge Workstation

The concept of a knowledge workstation was conceived at the Johns Hopkins University, Baltimore, United States, (Lucier et al. 1988). The workstation was intended to be an interactive system for the management and integration of clinical and operational datasets and literature-based biomedical knowledge. Initially, Johns Hopkins University developed two prototypes: the Integrated Academic Information Management System Workstation (IAIMS); and the Clinical Workstation (CWS). The IAIMS workstation was the academic information prototype of the knowledge workstation. It comprised the information transfer system including networked bibliographic and full text databases; and the knowledge management system including a set of online user tools for information retrieval, text creation, data collection and analysis, and communication. The Clinical Workstation (CWS) was developed as an electronic environment for the transfer of patient centred, operational information. It was recognised that differences existed between academic and operational databases, for instance, the character of information conveyed by the databases and the demands placed on the user interfaces.

2.3.5 The Advanced Function Workstation

At the Indiana University of Pennsylvania, Indiana, United States, research was undertaken to explore *"the use of new technologies in providing more sophisticated delivery systems for information services"* where the services of reference librarians were not available (Micco and Smith 1989, p. 135). The research involved developing an advanced function workstation equipped with a CD-ROM jukebox of reference books, with an interface to guide end-users to the material best suited to their needs. The system also aimed to provide guidance in the development of search strategies by mapping the end-user selected terms into the controlled vocabularies of the database. Broad searches yielding too much material could be narrowed, and specific searches broadened if required. The system was designed with the public in mind. In order to create a friendly, helpful, and flexible interface, window and mouse technologies were used. The system was first broken down into self contained modules, these were then implemented separately, and later tied together with a menu driven system. This is a similar concept to the Ei Reference Desk.

2.3.6 Ohio State University (OSU) Libraries' microcomputer program

In response to the proliferation of information, improved technology, decreasing budgets, and increased pressures on staff, the Ohio State University (OSU) libraries have developed a microcomputer program that enables library users to identify, select, locate and evaluate information for themselves (Tiefel 1993). This gateway to information guides end-users to the most relevant information that satisfies their needs, regardless of format. The gateway to information was developed in 1987, and comprises a microcomputer program that acts as a front-end to an online public access library catalogue, as well as other information sources. It guides the end-user through an information search, and allows the end-user to by-pass any steps irrelevant to their particular information needs.

2.3.7 The Integrated Workstation (IWS)

A team at Leicester Polytechnic (now De Montfort University), funded by Dawson Technology, developed the integrated workstation (IWS) (Adams 1990; Black 1989). The workstation provides online searching, downloading and manipulation of search results, access to CD-ROM's, and access to other packages including automation software. It was developed to provide for all of the librarians' information technology requirements, including the access, capture and manipulation of files, from a single desktop PC. One of the main objectives of the research was to use commercial software already available. The main packages used within the workstation were the Mirror communications package, and the Open Access office automation system. In order to provide a link between these packages and enable material to be manipulated and sent from one part of the system to another, the Automatic Text Editor was developed. Finally, Menugen software was used to provide both a front-end to link the software, and a system of menus. The workstation has since been marketed commercially by Dawson Technology.

2.3.8 Model workstation for the university of the future

Rosenberg (1989) discussed a model workstation for the university of the future that facilitates: the searching of bibliographic databases or library catalogues; the assembly of bibliographies; the ordering and acquisition of documents; and the preparation of manuscripts. A researcher using this model workstation would

commence a search for bibliographic information by using suitable CD-ROM and online databases, and the university library's OPAC catalogue. The combined references would then be downloaded and converted to a database within the workstation, all duplicate records would be deleted during this process. A bibliography could then be produced in the required format. References selected by the researcher would be sent via a modem to a workstation in the library where the documents would be scanned, and images sent back by fax modem to the researcher's PC. Word processing facilities incorporated into the workstation would help with the manipulation of material, which the researcher may then use within his/her work, for example when producing papers.

This scenario includes implications for the researcher, librarian, and publisher. The researcher would not have to physically enter the library in order to access references. The library would have to allocate large amounts of staff time to the scanning of printed documents. To improve this situation, documents could be stored electronically on a file server. The role of the library would also change, although it would still provide a reference function, it would increasingly have a greater role in user education and training. Finally, this type of system would have copyright and intellectual property implications which need to be addressed. The Ei Reference Desk has incorporated many of the features and facilities discussed in the above model. However, document delivery is proposed from either Ei or an alternative document supply centre.

2.4   Document delivery

2.4.1   The need for more efficient document delivery systems

In 1976, the Atkinson Report recommended *"the adoption of the principle of a self renewing library of limited growth"*, one in which new acquisitions would be offset to a considerable extent by withdrawals (University Grants Committee 1976, p.3). If libraries were to follow the proposed guidelines, no library could hope to be self sufficient in its literature holdings, especially with the increase in published information. The growth in interlibrary loans was discussed by a University Grants Committee working party, but it was not considered to be a factor that justified any modifications in the criteria for assessing the space requirements of university libraries. However, the committee did highlight that *"more highly developed methods*

are also required for the retrieval and distribution of the material available" (University Grants Committee 1976, p.9).

During the last few years, developments have rapidly taken place with electronic retrieval and telecommunication systems. These developments have increased the information retrieval options available to the end-user. The increase in user awareness, combined with improved retrieval systems, has enabled researchers to complete more comprehensive literature searches in relatively short periods of time. The large volume of references currently being retrieved through the new electronic sources, along with library stock limitations and financial constraints, have increased the need for more efficient document delivery systems.

Fjallbrant (1985, p. 533) stated that:*"an efficient document supply service should aim to provide a high satisfaction rate for requests, speedy delivery and at as low a cost as possible"*.

In June 1992, a survey conducted in the United States, with a sample of 108 librarians from academic, research and special libraries, identified two main reasons for the growth of document delivery services (Khalil 1993). These were: the lack of journal holdings due to financial pressures; and the increased use of CD-ROM and online database sources which provide citations to documents not held locally.

Most document delivery services have relied on fax to satisfy rapid delivery requests. Group III and IV fax machines enable users to send requests with almost 100 per cent reliability. Many fax machines allow for the stacking of documents, therefore, requests can be sent overnight when the telephone rates are low. Using a Group IV fax machine, a 10 page article can be transmitted over the ISDN in the same time as one page transmitted on a Group III machine (Braid 1993). However, current research into the electronic strorage and transmission of document images should facilitate substantial improvements in future document retrieval and delivery systems. The following section includes an overview of some recent investigations in this area.

2.4.2   Early developments

Adonis

During the 1970's, publishers became concerned about large scale copying from journals. The publishers decided to form a consortium, called Adonis (Article Delivery Over Network Information Systems), which would look at the possibility of providing document supply centres with journals, and using optical storage as a means of reducing operating costs. Any reduction in costs could then be shared between the centres and the publishers, and the use of the individual articles could be measured automatically. The centres would have been required to pay a subscription and a copyright fee to the publishers. The results of the initial studies demonstrated that the costs associated with the system would be prohibitive until computing costs decreased substantially.

In 1986, Elsevier, Blackwells, Pergamon and Springer Verlag proceeded with a smaller trial involving 218 biomedicine titles which were scanned and stored in CD-ROM format. The journals were indexed to produce a full bibliographic reference for each article.

The aim of Adonis was to provide material requested from journals owned by the publishers in the consortium. Interest centred around the proposed technology including the digitalisation of text and graphics, and the storage on optical discs (Bradbury 1988). In January 1991, a fully operational service began with over 400 titles (Korwitz 1990). The journals were selected according to the demand generated by pharmaceutical companies who often require rapid document delivery. The CD-ROM's are stored within a jukebox to allow multiple use of the whole database. When an item is identified it can be displayed on screen or laser printed. An annual fee exists for software, discs and service. A further licence fee per article printed is charged by the publishers.

Artemis

In 1979, the CEC commissioned Arthur D. Little to undertake a study on the feasibility of large scale document delivery and teletransmission in Europe (Norman 1982). The study proposed an open ended network of computers and communication links by which information providers could provide full text material on demand. The form of the documents would be fax or text reconstruction using available technology. Artemis (Automatic Retrieval of Text from Europe's Multinational Information Service) was conceived as a delivery service to supplement Diane (Direct

Information Access Network for Europe). Little thought that the market was not sufficiently defined to make Artemis possible without government intervention, and the report determined, that given the state of the art, only fax could handle both text and graphics.

In 1982, Pira, on behalf of the Publishers Association and the Directorate - General Information Market and Innovation, DG XIII, Commission of the European Communities, studied the relationship between end-user needs and the various electronic document delivery options. The study suggested that 82 per cent of the questionnaire respondents were willing to pay a premium for rapid delivery of important documents (Gates 1983). However, it was not established how many documents this represented. The British Library Document Supply Centre (BLDSC) developed their own delivery system 'Urgent Action' to provide a rapid service for customers. Telex and fax are used to order and receive documents, but the service costs three times the normal interlibrary loan rate.

Apollo

The Article Procurement with Online Local Ordering (Apollo) concept of electronic document delivery by satellite transmission was developed by the Commission of the European Communities (CEC) together with the European Space Agency (ESA), EUTELSAT, CEPT, and interested PTT's (Vernimb 1985). The following three different types of user were distinguished as potential customers:

- those large enough to justify their own earth station;
- those who co-operate together within a locality, and distribute documents from a terminal; and
- larger co-operatives connected to a digital network, with document terminals at each user's base.

The Apollo programme explored the electronic delivery of documents using high speed digital satellite links provided by the European Communications Satellite (CS) part of the satellite multiservice system. Objectives of the project included testing advanced document capture, storage retrieval, printing and display technologies, and exploring the use of a satellite link. Information was recognised as a very important resource, with more users requiring access to published information (Raitt 1985). Apollo was designed to overcome the problem of some information being available only from remote sources, and usually taking several days to arrive by post. The

concept of the project was later broadened to be applicable to a wide range of applications having the common requirements for the transmission of bulk data.

BLEND

The aims of the BLEND (Birmingham and Loughborough Electronic Network Development) project were to: explore and evaluate the use of an electronic communications network; and to assess the cost, efficiency, and impact of the system (Shackel and Pullinger 1984). The programme was established in July 1980, and continued on a four year time scale. Within the project, different forms of user communication were explored through an electronic journal and information network. This included the use of the network as an aid to writing and submitting papers, and scientific and technical communication. The academic networks, at the time of the BLEND project, proved to be costly and inadequate for effective use of this approach. The BLEND project came to an end in 1987, but was followed by the Quartet project.

Quartet

Quartet was a collaborative research project between University College London, Birmingham University, Loughborough University, and Hatfield Polytechnic (Tuck 1986, 1989). It aimed to improve the flow of information exchange in the academic community. The project investigated a wide range of factors affecting the creation and exchange of electronic information. The main functional components of the project were electronic messaging, computer-based conferencing, database access, and document delivery. The intention was to extend the range of functions in these three areas, by experimenting with different data types and mechanisms. The HyperBIT journal was produced by Quartet, and enhanced the printed version, titled BIT, with hypertext features.

DOCDEL

In late 1982, the Commission of the European Communities (CEC) issued a call for proposals involving market tests or investigations into electronic document delivery (Vernimb 1984). Ten proposals were subsequently selected, and research started in early 1984 under the framework of the DOCDEL programme. The experiments explored a range of different economic, technical, and organisational issues. The projects were co-operative between equipment supplies, publishers, online host operators, software houses, etc. The projects investigated all aspects: including production, storage, and delivery of documents. The projects were not expected to

compete with each other, but were intended to complement one another and generate an overall view of the possibilities available in Europe.

One of the DOCDEL projects, called TRANSDOC, covered all stages from the creation, to the storage and delivery of full text documents to users, and was the first document delivery system based on optical disc's (Soule 1987). TRANSDOC was a consortium contracted to undertake development work. It proposed to establish an electronic delivery system using two storage systems: one system with digitalisation and storage on optical and magnetic disc; and the other system with microfiches loading in an automatic access cabinet with digitalisation at the time of the document request. The two main objectives were: to improve storage conditions and access to primary documents; and consequently reduce delay and the costs of the supply of documents.

The overall objective of the EURODOCDEL project, started in 1984, was to test high quality electronic publishing and the state-of-the-art technology from European countries (Mastroddi 1988). This included optical discs, image scanning systems, satellite delivery of data, and video text applications. The project was set up as a joint venture in electronic publishing and document delivery between Europe Data of the Netherlands and CII-Honeywell Bull of France.

As with earlier research, the concepts encompassed within the DOCDEL projects often proved to be ahead of the available technology, but helped to establish the way forward and identify many of the benefits that could be achieved with the appropriate technology.

Project Hermes
Project Hermes was a proposed document delivery service sponsored by the Department of Trade and Industry (Amy 1985). The project was designed to satisfy the needs of users and providers of information for document delivery, using Teletex (a high-speed 2400 baud telex system) for the delivery of large complex documents. The project depended on the development of a Teletex network in Europe, but it was overtaken by developments such as electronic mail (e-mail) and the DTI cancelled the project in December 1984.

National Agricultural Text Digitising Project (NATDP).

The three phase National Agricultural Text Digitising Project (NATDP) was launched by the National Agricultural Library in 1987. The first two phases comprised a co-operative project to test scanning hardware and a search software systems for capturing full text and images in digital format for publication (Andre and Eaton 1988). During 1989/90, the National Agricultural Library (NAL) and the North Carolina State University Libraries (NCSUL) investigated the suitability of using the Internet for the immediate provision of digitised images of requested documents to the university libraries (McCone and Starr 1990). The Internet is a collection of networks which allow computers to communicate with one another (Press 1992). Currently, the majority of the universities in the United States are connected to the network. The third phase of the NATDP study investigated the transmission of both compressed and uncompressed files, and evaluated various methods of end-user document delivery on the university campus, including local area networks.

Building on the results of the pilot study, a further study was initiated in 1990 to identify and investigate the technical and administrative issues involved in local, regional, and national network electronic document delivery (Casorso 1992). The project investigated the transmission of library material between participating land grant libraries, and tested an end-user electronic document delivery system that allowed staff and students to receive library materials at their personal workstations. Researchers sent their document requests via e-mail to the interlibrary loans section in their library. The requests were then filed through the Digitised Document Transmission project sites. Satisfied requests were stored on a computer which automatically alerted the researcher that the documents were available for electronic pick-up.

2.4.3 Recent developments

Electronic Document Delivery System (EDDS)

The Electronic Document Delivery System (EDDS) is under investigation at the National Library of Medicine (NLM), Bethesda, United States (Thoma and Walker 1990). The system extends the imaging technologies of the prototype electronic document storage and retrieval system already implemented and tested at NLM. EDDS comprises three components: a document request workstation at the user site; a document retrieval and transmission system which includes the electronic store of document images; and the NLM mainframe containing Medline and other bibliographic databases. The system is designed for users to perform searches on a

bibliographic database, in this case Medline, and retrieve references. The references of interest may be selected, and the corresponding documents requested from the central electronic store. The documents are then retrieved automatically from optical or magnetic discs, and transmitted via fax to the user. If the requested document is not available in an electronic format, the printed document is scanned, then printed or faxed, and stored electronically for any subsequent requests.

The Mercury Electronic Library Project

In 1989, the Carnegie Mellon University Libraries began work on the Mercury Electronic Library Project (Troll and Richards 1992). One of the aims of the project was to build an advanced retrieval system that could deliver full text documents to desk-top computers at an affordable price. During 1992, a number of image projects were underway, linking bibliographic references with document delivery over the network, and the linking of databases. There are further plans to link the local holdings information to the commercially available bibliographic databases. The library catalogue will also be linked to circulation information.

Developments by University Microfilms (UMI)

University Microfilms (UMI) produces ABI Inform, a business database abstracting approximately 800 business and management journals. UMI have produced a link between the ABI Inform CD-ROM version to a database called Business Periodicals Ondisc (BPO) which contains full text articles from approximately 400 of the journals indexed on ABI Inform. References are retrieved using the ABI Inform database, if the full text article is available on BPO, the number of the appropriate disc is displayed. This facility offers a one-stop system for searching, retrieving and document delivery. UMI has to pay the journal publishers a fee of $0.10 per page printed from BPO. The software, therefore, automatically records the pages which have been printed and UMI bills the customer quarterly.

UMI have recently introduced a system called ProQuest Multi-access System (Leach and Tribble 1993). It allows the user to search UMI databases, and then retrieve requested documents from their library's UMI ImageServer. The ImageServer comprises PC, CD-ROM jukebox and software. Articles are stored as images on the jukebox, and may be routed to a dedicated printer or fax server. In the very near future, requests for articles not available on the ImageServer will be sent electronically to UMI's article clearinghouse where they will be satisfied for a fee.

E-mail document delivery at Sematech

At Sematech in Austin, United States, e-mail delivery was used to send online search results to their customers (Denton 1992). After investigating Dialog's electronic output options, it was found that results could be sent from Dialog into their own internal e-mail system via the Internet. The Internet delivery has since provided a cost effective alternative to the display and handling of search results and alert output.

'UnCover' service

There has recently been a growth in current alerting services, combined with individual article supply. The services include the rapid availability of title lists similar to online current contents, and the rapid provision of articles on demand as cheaply as possible. One such service, called 'UnCover', is produced by Carl Systems Inc. (Colorado Alliance of Research Libraries) based in Denver, Colorado. The service includes an electronic table of contents and access to a database with more than 2 million entries. Carl Systems Inc. offers electronic delivery of single articles from around 20,000 academic journals (Lenzini and Shaw 1992). Journals are sent from the contributing libraries to Carl Systems Inc., where staff check them in and create bibliographic references. The printed journals are then returned to the member libraries within 24 hours.

In September 1992, Carl Systems and B.H. Blackwells joined forces to develop and market UnCover 2, which includes journal articles and provides document delivery. If a copy of the article is not available locally, requests are sent to the appropriate contributing library, who then optically scan the documents and transmit the page images back to the central computer in Denver. The bit mapped images are transmitted from the computer to the end-user over the Internet. A further copy of the request is stored, subject to the publisher's agreement, to enable future requests to be automatically satisfied within a few hours. There is a service fee of $6.50 per article, plus a copyright fee which varies between requests. The database may be accessed through the local online catalogue, or the end-user's workstation via the Internet. Access to the database can also be customised to reflect local journal holdings. Documents are faxed to the end-user within 24 hours (Leach and Tribble 1993).

BIOSIS Document Express

BIOSIS and Dynamic Information Inc. have introduced BIOSIS Document Express (Pemberton 1994). The document delivery service fulfils requests for material referenced in Biological Abstracts and BioBusiness. Requests are accepted by mail, telephone, fax, or electronic transmission. Requests for documents indexed after

1992, are supplied within 24 hours. The requested documents may be returned by mail, courier, fax, electronic transmission, and over the Internet. The charge for documents indexed in BIOSIS after 1992 is $11 plus a copyright fee, and $13 plus a copyright fee for documents indexed in other sources. Urgent deliveries cost $10 extra per document.

Institute for Scientific Information (ISI)

The Institute for Scientific Information (ISI) offers a 24 hour delivery on standard orders through their 'Genuine Article' Service (Raitt 1992). Document delivery is provided from in-house resources.

Bath Information and Data Services (BIDS) ISI

Since 1993, Bath Information and Data Services (BIDS) ISI and BIDS EMBASE database users have been able to order documents directly from the British Library Document Supply Centre (BLDSC) (British Library 1994). The relevant articles have to be marked on screen, and a new order created. The cost of the service is £6.55 plus VAT for postal delivery within three days, and £7.65 plus VAT for a 24 hour fax delivery. Individual users may either charge the requests directly to a credit card, or place the order through the library and charge the request to a departmental account. There has currently been little use of the order system through the Pilkington Library. This may be due to the low cost and improved efficiency of the existing interlibrary loan service. Requests made through the BIDS service, for documents that are not currently available, are not added to a waiting list in the same way as interlibrary loan requests, even though the BLDSC only charge for requests that are satisfied. Loughborough University of Technology has had access to the Compendex Plus and Page One databases through the BIDS services, since early 1994.

UnCover and Bath Information and Data Services (BIDS)

An agreement was signed, on the 24th of March 1994, between UnCover and Bath Information and Data Services (BIDS) to provide access to the UnCover database and document delivery facilities to the UK higher education community (BIDS and UnCover 1994). The end-user has free access to UnCover including a document delivery service via fax, with a credit card payment. Later in the year, the BIDS online Document Ordering Service will be integrated with UnCover. This will enable documents located on any of the locally available BIDS databases to be ordered through the UnCover service.

Article Express International.

Engineering Information Inc. and Dialog Information Services have created Article Express International (Pemberton 1992). This company fulfils orders for document delivery suppliers, including EiDDS (Ei Document Delivery Service) and Source One Dialog's online document delivery service. Although academic institutions and commercial organisations may open direct accounts. Any journal article or conference paper may be ordered within engineering and technical literature.

Tulip

The Tulip project involves the delivery of forty-two journals published by Elsevier, North Holland, and the Pergamon Group to fifteen University Libraries in the United States (Rowland 1993). The database of journals is sent to Engineering Information Inc. who customise it to the requirements of the individual universities involved in the project. The database is then dispatched via the Internet. The participating libraries may subscribe to the full database, or the Index and ASCII files, with full articles on demand for an individual fee. This research project is due to finish at the end of 1995, and the main aims are directed towards economic and behavioural investigations.

Ariel

In America, the Research Libraries Group (RLG) has developed a software package called Ariel (Hawkins 1992). The Ariel applications software is combined with a microcomputer, scanner, laser printer, and communications equipment. Approximately, 12,000 journals are included and 300 articles are added each day. The software enables the user to overcome some of the compression problems encountered when forwarding scanned images.

Ariel software is a dedicated system and it only allows documents to be transmitted via the Internet to other Ariel workstations (Jackson 1993). It is designed to scan and delete, scan and store, or print locally, and can send and receive documents simultaneously. The Ariel software is being further investigated within the local area network on the campus of University College London.

CitaDel

CitaDel was introduced by the Research and Libraries Group (RLG) in 1992, and provides access to several databases (Leach and Tribble 1993). The databases are mounted on RLG's mainframe computer and accessed via dedicated lines, Internet, or dial-up access. Users may search across several databases with a single strategy. Access costs vary between databases. University Microfilms International (UMI) and Engineering Information Inc. provide the electronic document delivery of requested articles, although requests from some databases have to be made through the standard interlibrary loan system. Electronic document delivery is available through 'Ariel', RLG's document transmission software. Delivery is normally within two working days, but users may request fax delivery at a higher price.

RAPDOC

In the Netherlands, nineteen major libraries and PICA (a co-operative not-for-profit organisation) are working together on a rapid document delivery project (Costers and Koopman 1993). The aim of the project is to provide electronic delivery of requested articles from 7,000 scientific periodicals within a 24 hour period. Swets and Zeitlinger, the serials subscription agents, have provided a supply of machine-readable article references for the core titles. The requests will be scanned and stored on a document server, and transmitted when convenient to the receiving libraries, over the SURFnet network at speeds up to 64kbps. The requesting library will temporarily store the returned scanned images, and notify the end-user via e-mail, who can subsequently transfer the document to his/her workstation. RAPDOC is not a commercial activity and is based on the concept of a closed user group of the nineteen libraries. The project aims for electronic transmission of documents and not for the permanent storage of documents.

The SURFnet provides networked information and communication services in higher education, and scientific or industrial research throughout The Netherlands. It offers five basic services: e-mail, access to remote computers, file transfer, directory services, and distribution lists.

Ariadne: an integrated document delivery system

Ariadne is an integrated document delivery system which aims to deliver, as soon as possible, multimedia documents on demand for end-users (Dijkstra and Ngu 1993). The system operates within the University Libraries of The Netherlands. The system complies with the common standards developed by the Group on Electronic Document Interchange (GEDI). These standards are becoming widely accepted in the

libraries and networking environment. Document delivery is available by post, fax, or electronic delivery to the end-user's workstation.

OCLC

Online Computer Library Centre Inc. (OCLC) developed a union catalogue for its members in 1971 (Mitchell 1993). The database became not only a useful tool for cataloguing but also for interlending. OCLC participating libraries now have access to over 27 million items located in 45 different countries through the interlibrary loan subsystem.

The PRISM interlibrary loan system was introduced at the end of 1992. In order to support the system, OCLC installed a new international communications network with X.25 packet switching. Throughout Europe, OCLC is linked into JANET and via a gateway to the X.25 network. There is a transatlantic link via a 56k fibre optic cable. Users have access to the OCLC database interlibrary loan file, and the name/address directory of suppliers.

OCLC has a new delivery service called OCLC Dispatch. It links databases, such as ArticleFirst, with a document supplier. If a user wishes to request a specific article, he/she may request a list of providers with prices. The system then prompts the user for customer information and preferred delivery mode. After validation, the request is electronically transferred to the document provider. OCLC is also currently working on a gateway project. The project software will be implemented into a UNIX environment on a local campus network. This will enable the end-user to search OCLC bibliographic databases for citations and locations information. The user can then check the local OPAC, or transmit a request via OCLC to a document supplier.

BLDSC

The BLDSC is currently experimenting with X400 e-mail for the delivery of document facsimiles via the JANET network (British Library 1992). Using this high speed wide area network linking the UK universities, it has been possible to overcome the capacity limitations of conventional e-mail systems. The equipment costs are considerably more than a Group III fax machine, and the BLDSC will be assessing the cost effectiveness of the system. The integration of the whole cycle (i.e. an online search, document request and delivery) into one facility, is the main advantage of the system.

2.5 Telecommunications

The emergence of e-mail and the Integrated Services Digital Network (ISDN) has had a significant impact on developments in electronic document delivery. ISDN has evolved as a by-product of the telephone network digitalisation. A prototype ISDN network called IDA (Integrated Digital Access) was set up through British Telecom to cover the main commercial centres in the United Kingdom.

Voice signals in digital form require a 64k bps channel, so with ISDN, 64k bps data channels will be available at every phone point. Any type of data can be sent down this type of line and with this increase in speed many new applications have been made possible. *"A fax image of an A4 page scanned at 300 dots per inch (dpi) will generate about a Megabyte of data. Compression techniques will typically reduce this to 20 per cent or less (for ordinary text) so that the transmission time could be under 10 seconds per page"* (Tuck 1989, p.7).

The transmission time of an A4 page is a few minutes using a Group III fax machine at 200 dpi. The Ei Reference Desk document delivery process involves the scanning of documents at 300 dpi (Regazzi 1990). The image files are compressed and transmitted to the user's computer via the modem. The user's document display module decompresses and converts the file back, thus it can be viewed on screen or laser printed.

The Internet, based in the United States, offers many services including e-mail, file transfer, and remote login. It was available to over 10 million people from 102 countries throughout the world at the beginning of 1993 (Tillman 1993).

The launch of Super JANET opens up greater possibilities for the practical transmission of documents. Mill (1993, p. 24) stated that: *"With SuperJANET it would take half a second to send the Complete Works of Shakespeare from one point on the network to another site 250 kilometres away"*. At Loughborough, in common with many other UK sites, there is currently a 2 M-Bit/Second link to the JANET network. The Super JANET network, using high performance optical fibre technology, is aiming for connections at 34 or 144 M-Bit/Second. This will provide a network on which conventional data applications, voice, video, multimedia and other applications may be used. Presently, SuperJANET comprises two networks: a high-speed data network, and one using asynchronous transfer mode technology, which is better for audio and video transmission. It is hoped to have 55 sites linked, although

only a few will have access to asynchronous transfer mode technology. In the future, both networks will be merged, but until then many sites will only be connected to the data network. Super JANET can transmit up to 1000 million bits of information per second, about 1000 times faster than the present JANET network.

Current use of e-mail is text based with messages ranging from a few hundred to a few thousand bytes. The new X400 mail message standard will increase the types of data that may be sent, future images may be sent by fax, digitised voice, video, bit-map, and word processor forms, etc. These new developments will have further implications for the installation of hardware, software and future enhancements to the local area networks.

2.6   End-user searching

Over the last few years, computers have increasingly become widespread and more affordable to the general public for both office and home use. This familiarity with computer terminals has produced a potential end-user clientele, but questions regarding the quality of end-user searching still remain. The role of the librarian or information specialist from the early seventies developed into the role of an intermediary acting between the computer system and the end-user. The end-users provided search terms and guidance on the subject matter of the search. The intermediary translated the end-user's enquiry into the search language of the appropriate system, e.g. Dialog, and then provided the end-user with the search results.

This situation has been altered to some extent, by the increased use of personal microcomputers, along with the introduction of low priced end-user access to online services and simplified search language protocols. A number of producers are now marketing simplified alternative versions of their systems for out of business hours use, for example DIALOG's Knowledge Index. A number of studies have been performed on the use of bibliographic databases by end-users. Wanger, Cuadra and Fishburn (1976), studied the search behaviour of professionals, researchers, engineers, scientists, students, etc, and noted that, *"in approximately 27 per cent of the searches performed in that study, end-users worked directly with the intermediary at the terminal, guiding and providing immediate feedback relative to performance of the search. In about 5 per cent of the instances, end-users preferred to execute their*

own searches in spite of the availability of an intermediary" (Faibisoff and Hurych 1981, p. 350).

Richardson (1981) investigated, at the Raytheon Company's Submarine Signal Division, the extent to which engineers and scientists would use direct end-user searching in support of their work. The project participants attended in depth training sessions, hands on experience, and received a tutorial package. The outcome of the project was that, although participants were able to use the system, use by the end-users was low, even with free searching being provided for the first seven months of the project. Richardson concluded that the availability of a new search service did not necessarily change the information retrieval patterns of the engineers.

A study by Haines (1982), at the Kodak Research Laboratories, demonstrated that end-users preferred to conduct their own online searching rather than explaining their requirements to an intermediary. The end-users at Kodak were using highly organised and subject specific databases.

At the Exxon Research and Engineering Company, a similar study concluded that the low use by end-users could be attributed to the difficulties associated with online searching (Harman 1986). Infrequent users may find the online search language too complex, and may not be able to fully utilise Boolean logic for an effective search. Walton and Dedert (1983) suggested that: end-users should only be encouraged to perform searches using author, title, or natural language; and that assistance from an intermediary should be used for more comprehensive searches.

Janke (1984) discussed a project at the University of Ottawa, in which end-users compared and evaluated BRS After Dark and Dialog Knowledge Index. A total of 72.7 per cent of the end-users said they would be willing to run their own searches in the future, so long as technical help was available when required, and 13.7 per cent said they would conduct future searches with no support. Janke concluded that the system interfaces had overcome the barriers for the infrequent online searchers.

In 1989, a two year project was launched at the Getty Center for the History of Art, and the Humanities in Santa Monica, California to study humanities researchers operating as end-users of online databases (Siegfried, Bates and Wilde 1993). The researchers were each given a full day's training before they started their individual searches. They did not use the service as much as was expected, and there were

indications that their training period was not long enough to turn them into sophisticated searchers, although they managed to search reasonably well.

At Oaklands University, Michigan, a survey was conducted to identify end-users' attitudes towards CD-ROM databases (Schultz and Salomon 1990). Participants were asked to use both the CD-ROM and printed versions of the indexes and make comparisons between the two versions. The end-users were pleased with CD-ROM searching, and 83 per cent felt that it saved time. A total of 64 per cent found the CD-ROM easy to use, and 60 per cent were satisfied with their results. A total of 85 per cent (including users with very little computer experience) preferred to use the CD-ROM databases rather than the printed version.

At the Beecham Pharmaceuticals Research Division, methods of CD-ROM end-user searching and their impact on other information sources were investigated (Goldfinch 1990). The survey indicated that the scientists were only using basic search commands, and very few had incorporated truncations within their search strategies. It was also suggested that CD-ROM searching had not affected the information scientists' total volume of work, or the online search budget. The majority of end-users appeared to see the CD-ROM as an additional search option and not a replacement for any of the existing services.

Most end-users require some form of help and information in order to use new technologies. Torkazadeh and Doll (1993) identified three general categories of end-user support: consultation, training, and documentation. The documentation of computerised information systems has an important role to play in improving the end-users' satisfaction with, and their understanding of the system. Individual end-users have very different needs, but this may not influence documentation needs. Good documentation appears to be a cost effective way to meet many of the end-users' continuing suppport needs. However, the provision of an effective support system for a variety of end-users with different skill and motivation levels is essential, if the new technological resources are to be fully utilised.

CHAPTER THREE

DESCRIPTION OF THE EI REFERENCE DESK

3.0   DESCRIPTION OF THE EI REFERENCE DESK

3.1   Introduction

This chapter describes the equipment and facilities used during this research.
Equipment specifications have been presented below along with appropriate figures to
further illustrate the Ei Reference Desk. This description of hardware is followed by a
brief outline of the main software facilities and CD-ROM databases, as listed below:

- Compendex Plus;
- Page One;
- Ei Online;
- Ei Order; and
- Ei View.

3.2   Equipment specifications

The equipment used during this research was based in two different locations, linked
through the British Telecom telephone network. The function of the equipment based
at the Pilkington Library, Loughborough University of Technology, was to: search
the Ei Databases for relevant material; send document requests; and finally receive the
actual documents. The Ei Reference Desk workstation based at Loughborough,
comprised two Hitachi CD-ROM drives, an ALR Business EISA PC, a modem, and a
Hewlett Packard Laser jet printer (see Figure 3.1 to 3.3). The main function of the
equipment based at the British Library Document Supply Centre (BLDSC), Boston
Spa, was to: receive orders; scan the requested documents; and finally send the actual
documents. Equipment specifications for both sites have been listed on the following
page.

Equipment based at the Pilkington Library, Loughborough University of Technology, Loughborough, Leicestershire.

ALR Business VEISA 135 MB Disk 5 MB RAM PC
Phillips 3CM9809 Colour Monitor
Hitachi CD-ROM CDR1503S   (Two in number)
Logitec C.A. Serial Mouse
Hewlett Packard Laserjet III
Hewlett Packard Laserjet 2MB Memory Card
Miracom Courier HST Modem

Equipment based at the British Library Document Supply Centre (BLDSC), Boston Spa, Yorkshire.

Dell System 325 (5325) PC
Dell VGA Colour Plus Monitor
Hitachi CD-ROM CDR1503S   (Two in number)
Logitec C.A. Serial Mouse
Epson Laser Printer EPL 4100
Hewlett Packard Scan Jet Plus Scanner
Miracom Courier HST Modem

Figure 3.1: Ei Reference Desk: view one

Figure 3.2: Ei Reference Desk: view two

Miracom Courier
HST Modem

Phillips
Colour Monitor

Two Hitachi
CD-ROM
Players

ALR Business
Viesa PC

Hewlett Packard Laser Jet
III Laser Printer

Keyboard

Logitec Mouse
Attachment

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Figure 3.3
The Ei Reference Desk at Loughborough University of Technology

3.3 Access to Ei Reference Desk software and databases

The Ei Reference Desk was operated under the Microsoft Windows 3.0 environment.
At Loughborough, five facilities were available from the main menu: Compendex
Plus CD-ROM database; Page One CD-ROM database; Ei Online; Ei View; and Ei
Order. At the BLDSC, Boston Spa, the Faxit facility was also installed. Each of the
facilities were accessed by double-clicking on to the appropriate icon displayed on the
screen (see Figure 3.4 and 3.5). The intention at the start of the research was to locate
the workstation in an open access area of the library, however, the initial software did
not include any security measures to prevent the general library users access to the
workstation's control facilities. Thus, access was available to the Microsoft menus
including system files, control panel, print manager, Windows set-up, Microsoft
games and all of the search facilities. Engineering Information Inc. later provided
new software which allowed the administrator flexibility in assigning password entry
on to the workstation options. Access to online searching, document ordering,
document-view, and the program manager facilities was restricted at Loughborough.
Subsequent testing revealed that access was still available to all parts of the system
and the fault was reported to Ei Information Inc.

Figure 3.4: Ei Reference Desk main menu: view one
(Source: Engineering Information Inc. 1991)

Figure 3.5:   Ei Reference Desk main menu: view two

3.4 Compendex Plus

The Compendex Plus database is a DOS based CD-ROM search program distributed by Dialog. There are two search modes available on the database: Easy Menu search which incorporates option windows; and Dialog command search where the user can search by command language. Compendex Plus provides coverage of the world's significant engineering and technical literature, and combines references indexed in the printed version of Engineering Index, with the Engineering Meetings and Compendex files.

Over 1500 journals and 600 conference proceedings receive cover to cover abstracting and indexing, and another 200 plus journals are covered selectively. Other discipline specific subsets of the Compendex Plus CD-ROM are also available. The only one used at Loughborough was the Chemical Engineering subset 'Chem Disc'. The Compendex Plus database comprises annual discs, and updates which are produced on a quarterly basis. The discs ran in conjunction with other window-based components of the Ei Reference Desk. The workstation user was able to conduct a search using the CD-ROM database, and save the search strategy to run on subsequent annual discs or online. Online searching could have been set up using telecommunications access imbedded in the CD-ROM software. However, throughout the research, online searching was performed using the separate online facility incorporated within the workstation.

3.5 Page One

The Page One database is produced by Engineering Information Inc. The database operates within the Microsoft (R) Windows 3.0 environment, and search options are selected using the mouse attachment. It provides early access to information that appears later in Compendex Plus, as well as thousands of additional tables-of-contents. In May 1992, the World's Translation Index (WTI), which covers over 30,000 citations, was included on Page One. Page One only includes bibliographic details, but provides a 30 per cent greater coverage beyond that of Compendex Plus. The discs are updated and issued on a monthly basis.

3.6   Ei Online

Ei Online was an enhanced version of Crosstalk for Windows. Ei had made several
enhancements to the Crosstalk software, hence dialling and communications with
database vendors was a matter of selection. The master menu offered Search Ei,
System Defaults and Native Xtalk as summarised below.

- Search Ei:-   offered a quick log-on using established default
                           parameters, to a database vendor.
- System Defaults:-   used to set the default parameters.
- Native Xtalk:-   used for direct access through Crosstalk for windows.

In order to use the online module, access was set up at Loughborough through Native
Xtalk. This was necessary because the system was being used in the UK and Native
Xtalk provided the option of setting the parameters for access via the packet switching
service (PSS) using GNS Dialplus to the Dialog host. The system default settings
under the option 'Search Ei' were not appropriate for the type of access required from
Loughborough. After setting up a phone book entry with the required settings and
parameters, connection through GNS Dialplus was possible. The settings did not
have to be re-entered for any of the future search sessions conducted on the
workstation. The speed was set at 2400bps, GNS Dialplus worked at speeds
between 300 and 2400bps. Access via GNS Dialplus cost an initial £60, together
with a £5 per month standing charge, plus connection charges (1993 prices).

The Crosstalk menus were located at the top of the screen on the menu bar and
included 'file', 'edit', 'actions', 'setup', 'user', 'help', and 'windows'. The
commands to 'capture' and 'print' were located under the file menu. These two
commands were also available on the status bar and could be selected by double-
clicking with the mouse attachment. Before a search began, it was useful to select
'capture' which downloaded the search results from the Dialog host. Crosstalk
allowed the results of the search to be saved on a disk file. The saved search could be
accessed later via 'playback', located under the actions menu, and printed out if
required. If the printer option was selected at the start of the search, the session could
be displayed on the screen and at the same time automatically printed out.

3.7 Ei Order

Ei Order was the facility used to order full text documents, selected via Compendex Plus, Page One or Ei Online from a remote supply centre. It also had the option to allow orders to be manually entered. It was a windows based system, therefore, anyone familiar with this type of software could easily follow the order procedure (Engineering Information Inc. 1991). Unfortunately, it was not possible to adopt the Ei user guide procedure at Loughborough because the Miracom modem did not respond to the old dial tone. It was therefore necessary to manually enter commands to the modem, this approach was inappropriate for direct use by the majority of end-users.

3.7.1 Order procedure adopted at Loughborough

If relevant references were retrieved on the workstation, from either Compendex Plus or Page One, they were transferred throughout the search into an order file. In order to transfer references from Compendex Plus to the hard disk, they had to be saved in 'complete record Dialog tagged' format.

During individual searches, references were also printed out for the test group members. At the end of each literature search, test group members selected the very relevant items they wished to order from the search printouts. The references were then checked against the library catalogue to see if the library's stock could satisfy the requests. Any of the references not available in stock were selected and ordered from the original order files saved on the Ei Reference Desk. The order files were sent from the Ei Reference Desk at Loughborough, via the modem link, to the BLDSC at Boston Spa, Yorkshire. The BLDSC workstation was set up in the "receive" mode prior to accepting incoming order files from Loughborough (see Figures 3.6 and 3.7).

* References retrieved via CD-ROM and
  Online Databases

* References transferred into the Ei
  Order Facility

```
Modem
```

* Order file sent via Modem

* Telecommunications

```
Modem
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* Receive Mode

* Orders received at the BLDSC

* Order files printed

* Orders sorted and checked against BLDSC stock

```
Printer
```

* Requests photocopied

* Requests returned to Loughborough

Figure   3.6
Ei Reference Desk-Order Procedure

* Document requests located at BLDSC

* Requests electronically scanned

Scanner

* Ei Reference Desk file created

Modem
* Request file sent via Modem

* Telecommunications

Modem
* Receive mode

* Requests received at Loughborough

* Requests printed through the laser printer, or viewed on screen via Ei View facility

→ Printer

Figure 3.7
Ei Reference Desk - Proposed Document Delivery Procedure

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3.8 Ei View

Ei View was the facility that allowed documents requested via Ei Order to be received through an internal fax system. Within Ei View, documents could have been printed or viewed on screen using a selection of features including 'zoom' to enlarge or reduce a proportion of the screen image. Ei View operates within the Windows environment, however, the facility was not fully used during this research.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.0 RESEARCH METHODOLOGY

4.1 Introduction

The research began in August 1991, and the immediate priority was to organise some additional instructional documentation for the equipment and packages. Although Engineering Information Inc. had produced a manual, it was still in its draft stage (Engineering Information Inc., 1991). Three instructional guides were produced, these are listed below and have been presented in Appendix A:

- a guide to Easy Menu searching on Compendex Plus;
- a guide to help searching on Page One; and
- a guide to Dialog searching on Compendex Plus (for test group members).

The workstation was tested using evaluative research in the form of questionnaires. The initial intention was to establish a test group of academics, in order to assess the workstation. However, this was expanded to include general library users who could also contribute useful data. The first stage of the research involved a literature review of previous research relating to the following subjects: Engineering Information Inc.; workstations; document delivery; telecommunications; and end-user searching (see Chapter two).

4.2 Sampling

Before selecting the test group members, sampling techniques were reviewed and assessed. Fowler (1984, p. 12) stated that: *"a key to good sampling is finding a way to give all (or nearly all) population members the same (or a known) chance of being sampled"*, and also highlighted the following important points that should be considered when designing a survey:

- the choice of whether or not to use a probability sample;
- the sample frame or the people who actually have a chance to be sampled;
- the size of the sample;
- the sample design, or the particular strategy used for sampling; and
- the rate or percentage of response.

The preferred type of sample is the "Probability Sample" because it is unbiased, and the precision of the data can be estimated. This research required academics who would use the workstation over a five month designated period to locate material relevant to their current work. If a probability sample had been used, some of the test group members may have had little interest, or present need for the workstation. Testing of the workstation centred around genuine enquiries in a real life situation, thus producing a "Convenience Sample" (Kapadia and Andersson 1987).

The sample frame, sample size and the specific design of selection procedures, dictate how well a sample represents the population. The sample frame is the set of people that has a chance to be selected given the sampling approach that is chosen. In this research, the sample frame consisted of academic members of staff and researchers from the engineering departments at the University.

A letter was sent out to all of the engineering departments asking for volunteers to participate in the research. The letter explained the aims of the research and the contribution expected from test group members. Staff and students interested in the research were asked to return a reply slip at the bottom of the letter within a three week period. In return for participating in the research, a free document delivery service was offered. Since August 1991, the Pilkington Library has charged individual departments for interlibrary loan requests (£4 for each request). Because of these costs and research funds, free document delivery was only provided for test group members.

All members of the sample frame had the opportunity to put their names forward for inclusion in the test group. The response from departments was very good, and in October 1991 a test group comprising members of academic staff and researchers, equally distributed between the following departments at the University was established: Mechanical Engineering, Civil Engineering, Electronic and Electrical Engineering, Manufacturing Engineering, Transport Technology, and Chemical Engineering. In addition to these departments, there was one test group member from Geography and one from Computer Studies. The test group included the whole spectrum of hierarchy: Professors, Senior Lecturers, Lecturers, Research Assistants, Postgraduate Research and Course Students in the belief that this would provide a variety of searching patterns. If a bias response had been received, to any department or particular category of personnel, further sampling criteria would have been necessary.

Providing a free service over a five month test period was a financial factor which contributed towards the decision to aim for a sample size of around thirty-five to forty test group members. In total, forty-one responses were received and subsequently they all became test group members.

4.3 Questionnaires

Two questionnaires were designed and have been presented in Appendix B: the first was for test group members using the full workstation facilities over a five month test period; and the second was for general library users using the workstation on an ad hoc basis during the year. Although it was initially intended to use a questionnaire approach only with the test group members, the workstation created interest amongst general library users and it was considered that they would also provide useful feedback on the database search facilities available.

The test group members' questionnaire comprised the following five sections: user details; use of Compendex Plus/ChemDisc database; use of Page One database; general review; and document delivery. The general library users' questionnaire was identical to the test group members', apart from the omission of the document delivery section. The intention was to combine the questionnaire results with the findings obtained from the: literature review; equipment observations; and comparison studies.

Before the questionnaires were produced, literature relating to questionnaire design and analysis was reviewed, and indicated that a good questionnaire design depends on several factors, some of these are listed below.

- A questionnaire should be designed specifically to suit the study's aim and the nature of its respondents.
- There is a need for it to be clear, uniformly workable and unambiguous.
- The design must minimise any potential errors from respondents, interviewers, and data preparation staff.
- A questionnaire should be constructed so that the recorded answers can be easily edited, coded, and transferred on to computer files for later statistical analysis (Hoinville, Jowell and Assoc. 1985).

At Loughborough University, there is a data preparation section with whom general discussions took place before and after the questionnaires were produced, in order to ensure that the construction was correct for computer processing.

Throughout the questionnaires, verbal and rating attitude scales have been used, along with several open-ended questions which in many cases are difficult to code for later analysis but provide valuable information. The advantage of open-ended questions being that they permit the researcher to obtain answers that were unanticipated, and describe the real views of the respondent. Closed questions are usually a more satisfactory way of creating data for future analysis.

4.4   Questionnaire analysis

The questionnaire results were analysed using the social science statistical package called SPSS-X, originally produced at Chicago University (SPSS Inc. 1986). SPSS-X is a general statistics program aimed towards a wide range of users, not only social scientists. Initially, the questionnaire results were typed into two separate SPSS-X data files. SPSS-X control files, containing the values and variables, used in the analysis were then written for each questionnaire and have been listed in Appendix E. The data files were then processed against the control files, and the results were displayed in output files. The results of the analysis have been presented and discussed in Chapter five, using Microsoft Excel.

4.5   Comparison studies

In order to supplement the results of the questionnaire analysis, comparison studies were undertaken. The studies involved eight searches performed by Ei Reference Desk users. These searches were repeated using other retrieval sources available from Engineering Information Inc. (i.e. the same commercial source). The selection process was designed to ensure that these eight searches provided a representative sample of those performed on the workstation. These comparison studies aimed to:

- compare the printed and electronic sources available to the researcher;
- highlight some of the advantages and disadvantages associated with the various retrieval methods; and

- compare the search results retrieved by both the intermediary/librarian and the researcher/end-user.

The results of this study have been discussed in Chapter seven under the headings of the appropriate retrieval method. The following databases produced by Engineering Information Inc. were investigated.

- CD-ROM Compendex Plus
- CD-ROM Page One
- Online Compendex Plus
- Printed version of Engineering Index

4.6 Equipment

The equipment was installed with the assistance of Engineering Information Inc. before the start of the research. A great deal of the research time was spent setting up the different modules available on the workstation. Numerous equipment difficulties occurred throughout the research, these are outlined in Chapter six. Working within a fixed timeframe, these difficulties had an impact on the research, for example delaying the start of the test group member search sessions.

CHAPTER FIVE

QUESTIONNAIRE RESULTS

5.0 QUESTIONNAIRE RESULTS

5.1 Introduction

This section discusses the results obtained from the two questionnaires. The results have been analysed using the SPSS-X statistical package. The test group members' questionnaire was completed during each test session on a joint basis between the intermediary and the test group members. The test group comprised forty-one University members. During the test period of five months, thirty-three test group members used the workstation and conducted a total of forty-six searches. The testing of the workstation was based on real demand. Unfortunately, eight of the test group members did not require a literature search during the designated five month test period. At the beginning of the research, questionnaires were located next to the workstation for the general library users to complete. The initial response from the general library users was poor, therefore, subsequent questionnaires were handed out to users when they collected the CD-ROM discs. In total, seventy questionnaires were distributed to the general library users, and forty-eight were returned, a 68.6 per cent response rate.

5.2 User details

5.2.1 Status of Ei Reference Desk users

The status of users from the two groups varied. The test group comprised a high number of academic staff and researchers. In comparison, out of the forty-eight responses returned from the general library users, most of these were from undergraduate and postgraduate course students, as presented in Figure 5.1.

The breakdown of the forty-six searches conducted by the thirty-three test group members was as follows: Academic Staff, 39.1 per cent; Research Assistants, 34.8 per cent; Postgraduate Research, 21.7 per cent; Postgraduate Course, 2.2 per cent; and Undergraduates, 2.2 per cent. The indication being that, from the test group, Academic Staff tended to use the workstation once whilst other categories made more than one search.

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Figure 5.1: Status of the Ei Reference Desk users

Legend: ▨ TEST GROUP MEMBERS   ▨ GENERAL LIBRARY USERS

5.2.2　Classification of Ei Reference Desk users by department

Twenty-one per cent of the test group members were from the Manufacturing Engineering Department, the remainder were spread across the University's other engineering departments with the exception of two members, one from Geography and one from Computer Studies. Seventeen University departments were represented by the general library users, the largest proportion of users (22.9 per cent) were from the Civil Engineering Department, as presented in Table 5.1. Additional Ei Reference Desk use figures have been presented in Appendices H and I.

Table 5.1:　Classification of Ei Reference Desk users by department

Department	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
Mechanical Engineering	6	18.2	5	10.4
Electronic & Electrical Eng.	5	15.2	5	10.4
Chemical Engineering	4	12.1	1	2.1
Manufacturing Engineering	7	21.2	3	6.3
Civil Engineering	4	12.1	11	22.9
Transport Technology	4	12.1	2	4.2
Engineering Design Institute	0	0.0	3	6.3
Chemistry	0	0.0	1	2.1
Design Technology	0	0.0	1	2.1
Business School	0	0.0	1	2.1
Human Sciences	0	0.0	1	2.1
IPTME	1	3.0	3	6.3
External	0	0.0	7	14.6
Computer Studies	1	3.0	1	2.1
Geography	1	3.0	1	2.1
Pilkington Library	0	0.0	1	2.1
Mathematics	0	0.0	1	2.1
TOTAL	33	100.0	48	100.0

Note

IPTME = Institute of Polymer Technology and Materials Engineering

5.2.3 Previous use of different facilities now available on the Ei Reference Desk

The Ei Reference Desk users were ask to respond to a series of questions relating to their previous use of several facilities (CD-ROM products, Microsoft Windows software, printed Engineering Index, interlibrary loan service, and online search services) that had since been incorporated, in some form or other, within the Ei Reference Desk.

Over the last few years, the Pilkington Library has developed a CD-ROM database collection. The results indicated that 63.6 per cent of test group members and 68.7 per cent of general library users had some form of previous CD-ROM database searching experience. After this research was conducted, networked access to CD-ROM databases was introduced at Loughborough University. The restrictions of single user access (i.e. availability only through workstations based in the Library, and only at particular times) no longer applies to the majority of databases. This improved access should facilitate greater use of CD-ROMs (see Figure 5.2 for results).

Figure 5.2: Previous use of CD ROM products

TEST GROUP MEMBERS   GENERAL LIBRARY USERS

The user interface of any system is crucial, the Ei Reference Desk runs most of its applications through Microsoft Windows software. The majority of test group members (87.9 per cent), and general library users (60.4 per cent) had previously used the software. A high proportion of test group members (48.5 per cent) had used Microsoft Windows software on at least a weekly basis for other applications, and 48.0 per cent of general library users had used this software on a regular basis for work at the University. The familiarity with graphical user interfaces such as Microsoft Windows and the associated commands inevitably helped the Ei Reference Desk users with the system (see Figure 5.3 for results).

Figure 5.3: Previous use of Microsoft Windows software

☐ TEST GROUP MEMBERS   ☒ GENERAL LIBRARY USERS

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The printed equivalent to the Compendex Plus database (i.e. Engineering Index) was already available on open access in the Pilkington Library, however, the majority of test group members (54.5 per cent) and general library users (56.3 per cent) had never previously used the index (see Figure 5.4). When searching via Compendex Plus on the workstation, most users found the references very relevant to their work. In many cases, it appeared to be the lack in awareness of the index in the Library that accounted for the 'no use' figures.

Figure 5.4: Previous use of printed Engineering Index

| | TEST GROUP MEMBERS | GENERAL LIBRARY USERS |

The interlibrary loan service was used on a regular basis by the test group members, 33.3 per cent using it monthly. However, the service had not been previously used by 47.9 per cent of the general library users (see Figure 5.5). One reason for this may be that Loughborough students have to obtain counter signatures from academic staff before they can submit an interlibrary loan request, unless they are personally willing to pay £4 per request.

Figure 5.5: Previous use of interlibrary loan service

TEST GROUP MEMBERS   GENERAL LIBRARY USERS

The Library's online search facility, which involves online database searching through an intermediary, had not been previously used by 60.6 per cent of test group members, although 94.0 per cent were eligible to use the service. The lack of awareness of the online facilities available, could have accounted for the relatively small number of users (18.2 per cent) previously conducting searches via online Compendex Plus. The Library's online service is only available to staff and postgraduate research students. The results also show that out of the 41.7 per cent of general library users who were eligible to use the service, half of them had previously conducted an online search. However, only 2.1 per cent of general library users had previously used the service for a Compendex Plus database search. Very few people had required more than nine online searches over the last two year period (see Figures 5.6 to 5.9).

Figure 5.6: Previous use of online service

TEST GROUP MEMBERS   GENERAL LIBRARY USERS

Figure 5.7: Number of online searches over the last two years (1991/92)

Chart showing percentage of online searches by category:

	NONE	1-4 SEARCHES	5-8 SEARCHES	MORE THAN 9 SEARCHES
TEST GROUP MEMBERS	60	27	3	9
GENERAL LIBRARY USERS	79	16	6	4

Legend: ▨ TEST GROUP MEMBERS   ▨ GENERAL LIBRARY USERS

Figure 5.8: Previous use of online Compendex Plus

Bar chart showing percentage (%) on Y-axis (0 to 100) for categories YES, UNSURE, NO. TEST GROUP MEMBERS: YES ≈ 18%, UNSURE ≈ 9%, NO ≈ 73%. GENERAL LIBRARY USERS: YES ≈ 8%, UNSURE ≈ 11%, NO ≈ 92%.

■ TEST GROUP MEMBERS   ▨ GENERAL LIBRARY USERS

Figure 5.9: Number of previous online Compendex Plus searches

Bar chart showing percentage (%) on Y-axis (0 to 100) for categories NONE, 1-4 SEARCHES, 5-8 SEARCHES, MORE THAN 9 SEARCHES. TEST GROUP MEMBERS: NONE ≈ 82%, 1-4 ≈ 14%, 5-8 ≈ 3%, MORE THAN 9 ≈ 1%. GENERAL LIBRARY USERS: NONE ≈ 97%, 1-4 ≈ 2%, 5-8 ≈ 3%, MORE THAN 9 ≈ 1%.

■ TEST GROUP MEMBERS   ▨ GENERAL LIBRARY USERS

5.3 Compendex Plus/ChemDisc databases

5.3.1 Use of databases

None of the test group members had used the equipment prior to the test period. Initially, each test group member received 'easy menu search' training. A majority (76.1 per cent) of the searches were subsequently performed using the easy menu search mode. Dialog command language could also be used to search the databases. Although instructional documentation was provided, the Dialog command language was only used by a few test group members (see Table 5.2).

Table 5.2: Search mode used by test group members

Search mode	Test group members	
	Frequency	Per cent
Easy Menu	27	58.7
Dialog	9	19.7
Both	8	17.4
Neither	2	4.3
TOTAL	46	100.0

The Compendex Plus database was used by all of the test group members, and 97.9 per cent of general library users. Each questionnaire response contained data relating to the use of the annual Compendex Plus discs. Overall figures indicate the importance of up-to-date material. For both groups, the later the year the higher the percentage of use. A few general library users' questionnaires were completed before the 1991 disc arrived, which explains the slightly higher use figure for the 1990 CD-ROM disc (see Table 5.3).

Table 5.3: Compendex Plus search years for the Ei Reference Desk users

Years	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
1986	17	38.6	23	47.9
1987	19	43.1	24	50.0
1988	20	45.5	28	58.3
1989	23	52.3	34	70.8
1990	32	72.7	40	83.3
1991	38	86.4	38	82.6

Note:

The Compendex Plus CD-ROM database was not used in two of the test group member sessions.

The ChemDisc CD-ROM was not used by any of the test group members.

Overall, Compendex Plus was found to be 'easy' or 'very easy' to use by over ninety per cent of test group members, and over seventy-seven per cent of general library users, as illustrated by Figure 5.10.

The test group members' search times, when using the Compendex Plus database, ranged from 30 to 271 minutes, the general library users ranged between 15 and 390 minutes. The highest concentration of test group members searches (54.6 per cent) were performed between 31 and 90 minutes, and 41.7 per cent of general library users completed their searches within 31-60 minutes (see Table 5.4).

Figure 5.10: Compendex Plus - ease of use

| | TEST GROUP MEMBERS | | GENERAL LIBRARY USERS |

Table 5.4: Duration of Compendex Plus searches by Ei Reference Desk users

Duration	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
1-30 Minutes	0	0.0	10	20.8
31-60 Minutes	12	27.3	20	41.7
61-90 Minutes	12	27.3	4	8.3
91-120 Minutes	6	13.6	11	22.9
121-150 Minutes	10	22.7	1	2.1
151-180 Minutes	1	2.3	1	2.1
181-210 Minutes	2	4.5	0	0.0
211-240 Minutes	0	0.0	0	0.0
241-270 Minutes	0	0.0	0	0.0
Over 271 Minutes	1	2.3	1	2.1
TOTAL	44	100.0	48	100.0

Note:
The Compendex Plus database was not used in two of the 46 test group member sessions.
The Chemdisc CD-ROM and Ei Online were not used by any of the test group members.

The test group members received guidance in search techniques and formulation of strategies before they conducted searches on the workstation. Each general library user was given instructional documentation to help them use the Ei Reference Desk databases. If they required further help, an intermediary was available to assist with any problems encountered.

The ChemDisc CD-ROM was only used by 6.25 per cent of the general library users, and the disc was not used by any of the test group members. The user status figures indicate that there was only one Ei Reference Desk general library user from the

Chemical Engineering Department, and one from the Chemistry Department, so it was unlikely to expect a high rate of use for the ChemDisc. Although some of the test group members were chemical engineers, their search topics covered related areas, so they preferred to search the broader Compendex Plus database.

5.3.2   Easy menu searching

Out of the ten main easy menu search options, four were never used by test group members, however, only two of the main search options, 'author affiliation' and 'conference options', were not used by the general library users. The variance in the use of search options indicates a need for appropriate training and instructional documentation. The 'word/phase index' approach was used in 51.4 per cent of the test group member searches. The majority of the general library users (62.5 per cent) searched the Compendex Plus database using the word/phrase index , while the additional search option of 'words and phrases' (keyword) approach was used in 85.7 per cent of test group members, and 47.9 per cent of general library user searches. This may have been used to a greater extent by the general library users if it had been listed on the initial search option screen. The general library users who had used the other CD-ROM databases in the Library, and even the Library's OPAC, were familiar with keyword search facilities and expected to search in this way (see Tables 5.5 and 5.6).

Although there was a wide selection of search options available, test group members concentrated on subject searching, with a couple of searches being performed by author name. Most test group members wished to save search strategies for use on consecutive discs, 68.6 per cent of their easy menu searches were saved in this way, compared to 6.3 per cent of the general library users' strategies (see Table 5.5).

Table 5.5: Easy Menu search options used by Ei Reference Desk users

Search options used	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
Word/Phrase Index	18	51.4	30	62.5
Ei Subject Headings	0	0.0	10	20.8
Author Name	2	5.7	6	12.5
Author Affiliation	0	0.0	0	0.0
Title Words	1	2.9	9	18.8
Journal Name	0	0.0	2	4.2
Conference Options	0	0.0	0	0.0
Limit Options	1	2.9	2	4.2
Additional Options	30	85.7	23	47.9
Saved Search	24	68.6	3	6.3

Note: Thirty five test group member searches were performed using easy menu search options

Table 5.6: Easy Menu additional search options used by Ei Reference Desk users

Additional search options used	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
Words and Phrases	30	85.7	23	47.9
Ei Classification Codes	0	0.0	0	0.0
Major Subject Headings	0	0.0	2	4.2
Treatment Codes	0	0.0	0	0.0
Year of Publication	0	0.0	0	0.0
Language	0	0.0	0	0.0

The number of users requiring help to use Compendex Plus easy menu search mode did not differ significantly between the two groups, 82.9 per cent of test group members, and 89.6 per cent of general library users required additional help (see Table 5.7). The sources of help referred to by test group members when using Compendex Plus easy menu searching are presented in Table 5.8. Although the results indicate that a higher proportion of easy menu users required help, the search mode was used in 35 searches, compared to the use of Dialog commands in only 17 searches.

Table 5.7: **Ei Reference Desk users needing additional help to use Compendex Plus**

Search mode	Response	Test group members		General library users	
		Frequency	Per cent	Frequency	Per cent
Easy Menu	Yes	29	82.9	43	89.6
	No	6	17.1	5	10.4
Dialog	Yes	13	76.5	0	0.0
	No	4	23.5	0	0.0

Table 5.8: **Compendex Plus Easy Menu searching- Source of help referred to by Ei Reference Desk users**

Source used	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
Library Staff	29	82.9	31	64.6
Help Screens	0	0.0	2	4.2
Library Handout	4	11.4	21	43.8

5.3.3 Dialog searching

Some test group members further experimented with the Dialog command search language, and preferred this approach, after initial training and instructional documentation was provided. The command language allowed the users to build complicated search strategies, and search the database at a higher speed. Results in Table 5.9, show the use of the Dialog search commands, the majority of test group members used the basic search commands, and did not use truncation, or search specific fields.

Table 5.9: Use of Dialog search commands by test group members

Search commands used	Frequency	Per cent
S	12	70.6
SS	4	23.5
E	0	0.0
DS	8	47.0
Limitall	0	0.0
EXS	10	58.8
T	9	52.9
D	12	70.6
PR	1	5.9
Sort	0	0.0
AU	0	0.0
CO	0	0.0
CS	0	0.0
DT	0	0.0
JN	1	5.9
LA	0	0.0
PY	0	0.0
W	1	5.9
nW	1	5.9
N	0	0.0
nN	0	0.0
L	0	0.0
S	0	0.0
1	0	0.0
2	3	17.6
3	0	0.0
5	4	23.5
6	13	76.5
7	0	0.0
8	0	0.0

Note: Seventeen test group member searches were performed using Dialog search commands.

The Dialog command language was used in 37.1 per cent of the test group member searches, but was not used by the general library users (refer to Table 5.2). A total of 76.5 per cent of test group members using the Dialog command language required help with the system, as presented in Table 5.7. The sources of help referred to by test group members when using Compendex Plus via Dialog search commands are presented in Table 5.10.

Table 5.10: Compendex Plus Dialog searching- Source of help referred to by test group members

Source used	Test group members	
	Frequency	Per cent
Library staff	10	58.8
Help screens	0	0.0
Library handout	8	47.0

5.4   Page One

5.4.1   Use of database

The Page One database was used in twenty-nine of the test sessions, and the search 'expression' option was used in every search. A total of twenty-five (52.1 per cent) of general library users also searched the database, and the search facility 'expression' was used by 72 per cent of the general library users (refer to Table 5.11). Although the database includes contents pages, the majority of test group members performed subject searches. In total, 86.2 per cent of test group members, and 88 per cent of general library users required help with the Page One database (see Table 5.12).

Table 5.11: Page One search options used by Ei Reference Desk users

	Test group members		General library users	
Search options used	Frequency	Per cent	Frequency	Per cent
BROWSE	5	17.2	7	28.0
Alphabetical Titles	1	3.4	1	4.0
Journal/Issues	5	17.2	6	24.0
SEARCH	29	100.0	20	80.0
Expression	29	100.0	18	72.0
Direct	0	0.0	0	0.0
Results	0	0.0	4	16.0
Options	0	0.0	1	4.0
Search Assists	5	17.2	1	4.0
Word List	0	0.0	1	4.0
Operators List	3	10.3	0	0.0
Field List	0	0.0	0	0.0
Previous Search	3	10.3	0	0.0
ASSISTS	0	0.0	0	0.0
Edit Annotation	0	0.0	0	0.0
Return to Annotation	0	0.0	0	0.0
Place Bookmark	0	0.0	0	0.0
Return to Bookmark	0	0.0	0	0.0
Show Journal Title	0	0.0	0	0.0

Table 5.12: Help required by Ei Reference Desk users to use the Page One database

Response	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
Yes	25	86.2	22	88.0
No	4	13.8	3	12.0
TOTAL	29	100.0	25	100.0

Note
Twenty-three (47.9 per cent) general library users did not perform a search on the Page One database.

The test group members all obtained help from an intermediary, while the general library users obtained help from both the intermediary (68 per cent) and the library handout (44 per cent), see Table 5.13. The majority of people using the handout (63.6 per cent) found it 'helpful' or 'very helpful' (see Table 5.14). Despite the initial help to use the database, none of the test group members found it difficult to use; almost 80 per cent found it either 'very easy' or 'easy' to use. However, the general library users had more difficulty; 20 per cent, for example, thought it was 'difficult' to use (refer to Figure 5.11).

Table 5.13: Page One - Source of help referred to by Ei Reference Desk users

Source used	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
Library Staff	25	86.2	17	68.0
Help Screens	0	0.0	1	4.0
Library Handout	0	0.0	11	44.0

Note:

The Ei Training Manual was not used by any of the test group members.

Twenty-three (47.9 per cent) general library users did not perform a search on the Page One database.

Table 5.14: Helpfulness of Page One library handout to general library users

Degree of helpfulness	Frequency	Per cent
Very Helpful	2	18.2
Helpful	5	45.4
Adequate	2	18.2
Unhelpful	2	18.2
Very Unhelpful	0	0.0
TOTAL	11	100.0

Note

Fourteen (56 per cent) out of the twenty-five Page One general library users did not use the library handout. The Ei Training Manual was not used to assist Page One searches.

Figure 5.11: Page One - ease of use

Chart showing percentage responses for ease of use by category (VERY EASY, EASY, AVERAGE, DIFFICULT, VERY DIFFICULT), comparing TEST GROUP MEMBERS and GENERAL LIBRARY USERS. Y-axis labeled % from 0 to 45.

Legend:
- ▦ TEST GROUP MEMBERS
- ▨ GENERAL LIBRARY USERS

The Page One database was not used as heavily as the Compendex Plus database. Search results indicate that Ei Reference Desk users were primarily interested in keyword searching. The test group members found the database easier to use than the general library users, this may be because the general library users did not receive a training session from an intermediary, and a higher proportion (39.6 per cent) of the general library users had not previously used Microsoft Windows software before, in comparison to 12.1 per cent of the test group members..

Although the general library users completed all of their Page One searches in under 30 minutes (the results showed that 68 per cent of the searches were completed within 15 minutes), 20.7 per cent of test group members spent more time searching the database. Page One search times for test group members ranged between 10 and 150 minutes. This search process is faster than Compendex Plus hence 79.3 per cent of the searches were completed within 30 minutes (see Table 5.15).

Table 5.15: Duration of Page One searches by Ei Reference Desk users

Duration	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
1-30 Minutes	23	79.3	25	100.0
31-60 Minutes	4	13.8	0	0.0
61-90 Minutes	0	0.0	0	0.0
91-120 Minutes	1	3.4	0	0.0
121-150 Minutes	1	3.4	0	0.0

5.5 General review

5.5.1 Search results

The Ei Reference Desk users were asked to classify their search with respect to the broad Ei subject categories (see Table 5.16). Although 33.3 per cent of the general library user searches were classified under 'Mechanical Engineering', the results indicated that some of the general library users from other engineering departments had performed searches relating to Mechanical Engineering.

Table 5.16: Broad Ei subject categories of searches by Ei Reference Desk users

Ei subject category	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
Chemical Engineering	5	10.9	4	8.3
Civil Engineering	4	8.7	12	25.0
Mechanical Engineering	9	19.6	16	33.3
Electrical & Electronic Eng	15	32.6	8	16.6
Mining, Metals & Petroleum Engineering	1	2.2	2	4.2
Other categories				
Chemistry	0	0.0	1	2.1
Computing	1	2.2	0	0.0
Engineering Design	0	0.0	1	2.1
Manufacturing Engineering	10	21.7	3	6.3
Materials Engineering	0	0.0	1	2.1
Optical Engineering	1	2.2	0	0.0
TOTAL	46	100.0	48	100.0

Note:

Two of the test group member searches conducted on the workstation involved both Mechanical and Electrical Engineering topics.

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All test group members retrieved a number of references from their searches. The total number of initial references retrieved per search ranged from 22 to 824. The total number of references retrieved by general library users ranged between 0 and 337 per search. In total, 45.8 per cent of the general library users found between 1 to 50 references on the workstation, and 12.5 per cent found no references at all, in some cases this was due to the individual's search strategy, and the selection of search options on the workstation (see Table 5.17).

Table 5.17: Total number of references retrieved by Ei Reference Desk users

Number of references	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
0	0	0.0	6	12.5
1-50	4	8.7	22	45.8
51-100	5	10.9	11	22.9
101-150	7	15.2	2	4.2
151-200	4	8.7	3	6.3
201-250	7	15.2	2	4.2
251-300	5	10.9	1	2.1
301-350	3	6.5	1	2.1
351-400	2	4.3	0	0.0
401-500	4	8.7	0	0.0
More than 500	5	10.9	0	0.0
TOTAL	46	100.0	48	100.0

Tables 5.18 and 5.19 summarise the relevance of references retrieved from the databases, for example, under 25 per cent of the references produced in 93.5 per cent of the test group member searches were considered to be 'very relevant'. The general library users found a greater proportion of 'very relevant' material for their work in comparison to the test group members. One reason for this may be associated with user status. The majority of general library users were course students, requiring references on broader subject areas for coursework and course projects. The test

group members included a high proportion of staff, who required information on a narrow specific subject area currently under investigation.

Table 5.18: Relevance of references retrieved by test group members

Degree of relevance	0 - 25%	26 - 50%	51 - 75%	76 -100%
Very Relevant	43 (93.5 %)	3 (6.5 %)	0	0
Relevant	38 (82.6 %)	5 (10.9 %)	3 (6.5 %)	0
Not Relevant	2 (4.3 %)	4 (8.7 %)	24 (52.2 %)	16(34.8%)

Table 5.19: Relevance of references retrieved by general library users

Relevance	0 to 25%	26 to 50%	51 to 75%	76 to 100%
Very Relevant	33 (68.8%)	10 (20.8%)	2 (4.2%)	3 (6.3%)
Relevant	24 (50%)	12 (25%)	7 (14.6%)	5 (10.4%)
Not Relevant	19 (39.6%)	10 (20.8%)	8 (16.7%)	11 (22.9%)

Test group members were asked how many of the retrieved references they wished to review. In 67.4 per cent of the test group members' searches, the intention was to follow up between 1 and 50 references. The majority (70.8 per cent) of general library users also indicated that they intended to review between 1-50 references retrieved on the Ei Reference Desk (refer to Table 5.20).

Table 5.20: Number of references to be reviewed by Ei Reference Desk users

Number of references	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
0	1	2.2	10	20.8
1-50	31	67.4	34	70.8
51-100	7	15.2	1	2.1
101-150	1	2.2	1	2.1
151-200	5	10.9	0	0.0
More than 201	1	2.2	2	4.2
TOTAL	46	100.0	48	100.0

In thirty (65.2 per cent) of the test group member searches, other sources had been used to find information before using the Ei Reference Desk. A total of 55.6 per cent of the general library users stated that they had already used other sources to retrieve information on their search topics. Table 5.21 presents the sources already consulted by the Ei Reference Desk users. The results show that the test group members used the BIDS ISI citation service more than any of the other consulted sources (26.7 per cent). However, comments received from test group members revealed that the results had been poor for searches performed on BIDS ISI. In comparison, 'very relevant' material had been retrieved using the Ei Reference Desk databases.

Table 5.21: Sources already consulted by Ei Reference Desk users

Source	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
Building Management Abst	1	3.3	1	4.0
Chemical Abstracts	0	0.0	1	4.0
Computer and Control Abst.	0	0.0	1	4.0
Current Technology Index	0	0.0	4	16.0
Electrical and Electronic Abst.	6	20.0	0	0.0
Engineering Index	5	16.7	2	8.0
European Access	1	3.3	0	0.0
IEEE Publications Index	1	3.3	0	0.0
Index to Theses	1	3.3	0	0.0
MIRA Automobile Abstracts	0	0.0	1	4.0
Pera Abstracts	4	13.3	0	0.0
Rapra Abstracts	0	0.0	1	4.0
Science Citation Index	2	6.7	2	8.0
STAR	2	6.7	0	0.0
ABI Inform CD-ROM	1	3.3	1	4.0
BIP PLUS CD-ROM	0	0.0	2	8.0
Bookbank CD-ROM	0	0.0	4	16.0
ASTI CD-ROM	5	16.7	15	60.0
CITIS CD-ROM	1	3.3	5	20.0
BIDS/ISI	8	26.7	1	4.0
Online Search	2	6.7	3	12.0
Library OPAC catalogue	7	23.3	4	16.0
Browsing book stock	1	3.3	0	0.0
Current journals	3	10.0	0	0.0
European Documentation	1	3.3	0	0.0
Lecturers' recom. reading	1	3.3	1	4.0
Library search via students	1	3.3	0	0.0
Other Library Collection	3	10.0	0	0.0
SAE Publications	0	0.0	2	8.0

In total, 82.6 per cent of test group members, and 71.1 per cent of general library users still intended to search further abstracting sources/services for more information after completing their Ei Reference Desk searches. These users did not see the Ei Reference Desk databases as a comprehensive source of information, but more as a source of information that should be consulted in conjunction with other abstracting and indexing sources and services. Access via online searching to other databases would enhance the workstation, but the associated charges may limit the access of some users. With the growth in CD-ROM technology, it has been previously indicated that many library users only consult the CD-ROM sources and no longer use the relevant printed sources. The results showing sources already consulted (as presented in Table 5.21), suggest that although the demand for CD-ROM databases and electronic services was high, there was also a need for specific printed sources.

The majority of test group members (97.8 per cent) indicated that the references they had retrieved on the workstation were to be used within current research projects at the University. The results show that 62.5 per cent of the general library users also required information for current research projects (see Table 5.22).

Table 5.22   Intended use of references retrieved by Ei Reference Desk users

Area of use	Test group members		General library users	
	Frequency	Per cent	Frequency	Per cent
Teaching	7	15.2	4	8.3
Research project	45	97.8	30	62.5
Coursework	5	10.9	10	20.8
General interest	0	0.0	4	8.3
Useful to colleagues	7	15.2	5	10.4
Other areas	0	0.0	2	4.2

5.5.2   Equipment user interface

The Ei Reference Desk users' assessment of the "ease of use" for the mouse, Microsoft Windows software, and menu screens for both Compendex Plus and Page One are presented in Figures 5.12 to 5.16. In the majority of test group member searches (71.7 per cent) the mouse attachment was found to be 'very easy to use', and nobody found it difficult to use. The test group members overall found little difficulty with the mouse and software aspects of the workstation. The results show that general library users found both the mouse attachment (46.8 per cent) and Compendex Plus Windows software (65.9 per cent) 'easy to use' (refer to Figures 5.12 and 5.13). However, the general library users did have more problems with the Page One Windows software. Although 48 per cent thought it was 'very easy' or 'easy' to use, the other responses of 36 per cent for 'average' and 16 per cent for 'difficult' indicate additional training may be necessary (refer to Figure 5.14). The results also show that general library users found the menu screens of Compendex Plus, easier to use than on Page One (see Figures 5.15 and 5.16).

Figure 5.12: Mouse - ease of use

☐ TEST GROUP MEMBERS   ☒ GENERAL LIBRARY USERS

Figure 5.13: Windows software: Compendex Plus - ease of use

TEST GROUP MEMBERS ▧ GENERAL LIBRARY USERS

Figure 5.14: Windows software: Page One - ease of use

TEST GROUP MEMBERS ▧ GENERAL LIBRARY USERS

Figure 5.15: Menu screens: Compendex Plus - ease of use

TEST GROUP MEMBERS   GENERAL LIBRARY USERS

Figure 5.16: Menu screens:- Page One - ease of use

TEST GROUP MEMBERS   GENERAL LIBRARY USERS

All of the Ei Reference Desk users were asked whether they preferred to search on the Ei Reference Desk by themselves or through an intermediary. The majority of test group members (57.6 per cent) preferred to search by themselves, 9.1 per cent indicated both search methods were acceptable, and 33.3 per cent preferred to search through an intermediary. The majority (88.9 per cent) of the general library users preferred to conduct searches on the Ei Reference Desk by themselves rather than through an intermediary. Although a greater proportion of general library users when compared to test group members, preferred to search in this way, results show that the general library users experienced more difficulties with the workstation than the test group members (see Figure 5.17).

Figure 5.17: Ei Workstation:- search preference

TEST GROUP MEMBERS   GENERAL LIBRARY USERS

5.6   Document delivery

5.6.1   Requests

Loughborough University was the beta test site for the Ei Reference Desk, therefore, the document delivery module was under close observation and investigation throughout the research period, and was operated only by test group members in conjunction with an intermediary. All test group members retrieved references when searching on the workstation. After scanning the abstracts, members selected relevant papers they wished to order. Before the papers were ordered, the Pilkington Library's stock was checked for the requested items. Overall, the greater proportion of selected items were not available from the Library's own stock (as shown in Table 5.23).

**Table 5.23: Percentage of selected references already available in the
Pilkington Library's stock**

0 %	1-20 %	21-40 %	41-60 %	61-80 %	81-100 %
5 (10.9 %)	12 (26.1 %)	16 (34.8 %)	13 (28.3 %)	0 (0.0 %)	0 (0.0 %)

The BLDSC supplied between 81-100 per cent of requests ordered for 91.3 per cent of the searches conducted on the Ei Reference Desk (see Table 5.24). In 10.9 per cent of the searches, all requests had to be supplied by the BLDSC. However, some of the remaining searches still had requests unsatisfied. The two reasons given were that: 23.9 per cent of the searches had requests which were 'not available'; and 32.6 per cent of the searches had requests that had been added to the British Library waiting list. Some of the 'waiters' continued to filter through the system months later to satisfy the search requests.

Table 5.24 Percentage of requests received via document delivery

0 %	1-20 %	21-40 %	41-60 %	61-80 %	81-100 %
0 (0.0 %)	0 (0.0 %)	0 (0.0 %)	1 (2.2 %)	3 (6.5 %)	42 (91.3 %)

5.6.2 Documents received

Test group members were asked to rate, by percentage, the relevance of the requests
they had received back from the BLDSC, and the results have been presented in Table
5.25. For example, in 34.8 per cent of the searches, between 0-25 per cent of the
documents were considered to be 'very relevant', and 37.0 per cent of the searches
produced between 26-50 per cent 'very relevant' documents. A substantial
improvement on the figures presented in Table 5.18 which shows the initial degree of
relevance.

Table 5.25: Relevance of requests received via document delivery

Relevance	0-25 %	26-50 %	51-75 %	76-100 %
Very Relevant	16 (34.8 %)	17 (37.0 %)	7 (15.2 %)	6 (13.0 %)
Relevant	9 (19.6 %)	21 (45.6 %)	11 (23.9 %)	5 (10.9 %)
Not Relevant	37 (80.4 %)	8 (17.4 %)	1 (2.2 %)	0 (0.0 %)

When the test group members were asked whether the speed of access to documents
was important, everybody replied that it was to some degree (see Figure 5.18), and
39.4 per cent felt that speed of access was important 'sometimes'. Further comments
made by the test group members (as presented in Appendix C) suggest that it depends
on the work being undertaken at any one time.

Figure 5.18: The importance of a rapid document delivery service to test group members

The current interlibrary loan charge is £4, test group members were asked if they would be prepared to pay £12 for a rapid service through the Ei Reference Desk, 39.4 per cent responded with a 'Yes' answer (see Figure 5.19). The rapid service currently operated by BLDSC costs three request forms, hence the proposed sum of £12.

Figure 5.19:   Test group members prepared to pay £12 for a rapid document delivery service

39.40%

60.60%

▦ YES ▨ NO

5.7 Summary

The test group members' questionnaire was completed on a joint basis between the intermediary and the test group members, consequently, a 100 per cent rate of return was recorded. The general library users' questionnaire was distributed to library users who returned the questionnaire at a later date, this questionnaire had a 68 per cent rate of return. The user status of the two group varied, there was a higher concentration of staff and researchers in the test group, and most of the general library users were either undergraduate or postgraduate course students.

Significant differences in the use of some of the library services can be attributed to user status, cost, and awareness of the services. However, it is important to realise that users have different types of information needs. For example, the test group members may have required more up-to-date research material, but this was not reflected in the previous use of the online service. Although just under half of the general library users had access to online searching, they may not have had the same in-depth information needs.

This may have been the same with interlibrary loans, again a high proportion of general library users had not used the service, but this time both user status, cost, and need may have been restricting factors.

The printed version of Engineering Index, although on open access in the library had not been used by over half of the Ei Reference Desk users. This may be due to a lack of awareness, because a high proportion of searches performed on the workstation proved successful in retrieving relevant information.

The majority of Ei Reference Desk users had previously used Microsoft Windows software on a regular basis for other applications within departments. The popularity of this software makes it the ideal base on which to develop the Ei Reference Desk. If the user is familiar with the interface, the system immediately becomes more approachable and user friendly.

Although many of the Ei Reference Desk users were new to some of the technology incorporated within the workstation, the majority found the Compendex Plus facility 'easy' or 'very easy' to use. More of the Compendex Plus search options were used by the general library users in comparison to the test group members. The general library users also experimented with more of the search options, but in many cases

did not search as effectively as they might have done using more appropriate options. One particular useful search option 'words and phrases' allowed the searcher to perform a keyword search. Unfortunately, this option was only available under additional options, rather than accessible via the initial search option screen. A total of 47.9 per cent of general library users and 87.9 per cent of test group members used this search option. If the option was appropriately titled and available as a main search option, its use by general library users may have increased. General library users who had used other CD-ROM databases already available in the library, expected to search by keyword as used on the other available databases. The majority (62.5 per cent) of general library users searched via the word/phrase index, however, this function was only used by 51.4 per cent of the test group members. The Ei subject headings option was used by 20.8 per cent of the general library users, but no test group members used this option. Overall, the differences between the two groups indicate a need for training and support to ensure the selected search options are appropriate for any particular search.

The Page One database was not used as heavily as the Compendex Plus database. Search results indicate that test group members were primarily interested in keyword searching. Although 80 per cent of general library users also used the 'search' facility, a higher proportion used the other options available. The test group members found the database easier to use than the general library users, this may be because the general library users did not receive a training session from an intermediary, and a higher proportion (39.6 per cent) of the general library users had not previously used Microsoft Windows software, in comparison to 12.1 per cent of test group members.

A high proportion of the general library users completed searches in under 60 minutes, but the test group members spent more time searching the databases. Although the general library users completed all of the Page One searches in under 30 minutes, 20.7 per cent of test group members had considerably longer search sessions. A large proportion of the Ei Reference Desk users found the mouse attachment, and Compendex Plus Windows software 'easy to use'. However, the general library users did not find the Page One windows software and menu screens so 'easy to use'.

A high proportion of the searches performed on the workstation were very successful in retrieving relevant information. However, the majority of Ei Reference Desk users saw the workstation as only one possible source of information, and they intended to continue their searching through other library materials.

The document delivery service was only used by the test group members. The results indicated a need for access to a rapid document delivery service, although the majority felt that they would not require this type of service all of the time, and were not prepared to pay £12.

A high proportion of the document requests had to be ordered from the BLDSC, in all of the searches at least 40 per cent of the required documents had to be ordered because they were not available on-site.

CHAPTER SIX

EQUIPMENT OBSERVATIONS

6.0   EQUIPMENT OBSERVATIONS

6.1   Compendex Plus

The Compendex Plus database was not fully integrated with the other workstation facilities because it was a DOS based system. This was particularly evident when using the order procedure. In contrast to Page One, there was no screen option to order, instead, references had to be transferred to disc in the Dialog format.

Throughout the research, very few users preferred the Dialog display format, consequently, the reference display format had to be changed before documents could be ordered. When the format was not changed, the ordered references could not be displayed later on the Ei Order facility.

The database content was very impressive and both search modes were easy to use. The Dialog command language mode was particularly useful to staff who wished to conduct both CD-ROM and online searches. It was possible to formulate and test search strategies on disc prior to online searching, and hence avoid costly connection charges.

Some users required guidance on the database search terminology. In particular, many users did not associate keyword searching with the additional search option of 'words and phrases'. The majority of users preferred to perform keyword searches, but this facility was only available as an additional option, and was not available on the main search option screen.

Over the research period, a significant number of CD-ROM drive errors were reported. In many cases, the user was asked to select 'retry or abort'. In practice, the options had the opposite effect. A user wishing to continue browsing through a list of references had to select 'abort' to continue, by selecting 'retry' the search was aborted.

One test group member conducted an easy menu search using a long search strategy, but was unable to complete the search because of 'insufficient workspace for the search'. However, the same search was successfully performed using the Dialog command language search mode. The Compendex Plus database was different to other CD-ROM databases already in use at Loughborough, because it was available on annual discs.' Although search strategies could be saved for use on subsequent

discs, many users considered that the ability to search without changing discs would be a desirable feature.

Comments from the Ei Reference Desk users regarding Compendex Plus can be found in Appendices C and D of this thesis. Throughout the research, a clipboard was placed next to the workstation on which user's technical problems were noted, see Appendix F for a summary of the comments received.

6.2   Page One

The Page One database is a windows based system, and integrated very well with the other components of the Ei Reference Desk. Engineering Information Inc. had incorporated an option to order documents through Page One, and this also worked very well. Ordering was a straightforward process involving the selection of 'Order' from the bottom of the search window when an item had been highlighted. The system then asked the user to confirm the order, which if confirmed was then automatically transferred into the default order file, unless another file was designated. The requests could be accessed at a later date via the Ei Order facility.

The print option was not flexible enough, for example, in an expression (keyword) search, a complete list of retrieved references could be displayed and printed, but it would have been better if the appropriate references could have been selected prior to printing. Improvements are also required for author searching, the system could search by surname, but if initials were included, the system would search for a separate match. For example, a search for the surname 'Price' retrieved 591 references, too many to browse through. The following illustrates a search procedure for an author including initials which took the system approximately five minutes of search time.

Search expression	=	Price A.D.F.		

Search results	=	Price	=	591
		A	=	183411
		(01) pre/1 (02)	=	12
		D	=	71591
		(03) pre/2 (04)	=	6
		F	=	37797
		(05) pre/3 (06)	=	6
		Total number of references	=	6

The above search time could have been reduced by limiting the search by surname and the first initial. This would have produced twelve references to be viewed, although only six would have been written by the same author.

Some users encountered problems with the search terminology. In particular the search 'expression' option. The Ei Reference Desk users' comments regarding the Page One database have been presented in Appendices C and D.

6.3 Ei Online

Access to the Dialog host was virtually impossible during the early afternoon busy period, for this reason, the searches and test sessions were performed in the morning. However, a certain amount of connection problems were also encountered during the morning sessions.

The system had the option to 'upload' search strategies already formulated, when a connection was made with the database host. The search strategies were uploaded from a windows 'notebook' option, and not from search strategies saved during previous CD-ROM database searches.

The online module had the advantage of being able to search for earlier and more up-to-date references than the CD-ROMs on trial. The extra costs of tele-communications, host connection charges, and print costs must be taken into account when selecting the online search mode.

6.4 Ei Order

If the workstation was based in an engineer's office, the references could be transferred into the order file for immediate transmission after the completion of the literature search. However, as the tests were performed in a library environment, it was important to check on-site holdings first, because documents may have been immediately available for use by the test group members, and a saving could have been made on the British Library request forms.

After initial testing, it was found that order files could only hold between 30 and 40 references within a file before the dynamic memory was full, thus small order files had to be created during literature searches conducted on the workstation. One file was created containing 33 references (63591 Bytes). Although the records could be saved to the file within the Ei Order module, they could not be viewed because of the dynamic memory problem. The same references were then saved again, but this time 32 references (62131 Bytes) were transferred and no problem existed with the Ei Order module. Another two files were created both containing 33 records. However, the file sizes varied, one at 58108 bytes and the other at 53617, again there were no access problems through the Ei Order module. The Ei Order dynamic memory problem therefore arose when the file size reached between 62131 and 63591 bytes. Care was taken not to exceed the file size, this involved careful detailing of all search results, which would not be desirable in a normal working environment.

Two modems were used to transmit orders and documents between Loughborough and Boston Spa. Initially, there were several problems with the equipment set-up. The original modems acquired for the research would not work at the consistent high speed required to make electronic scanning a realistic or feasible form of document delivery. Speed is essential, otherwise documents would take hours to scan and transmit, and the whole process would consume too much staff time. At the beginning of the research, staff at the BLDSC worked with the original modems on site, but still could not sustain the high speed required for document transmission. It was subsequently decided to invest in a new pair of Miracom Courier high speed modems. The first testing at BLDSC produced a speed of 19.2 bits per second. After successfully testing between different buildings on-site, one modem was returned and installed at Loughborough. Crosstalk for Windows Software, a communications program designed specifically for the Microsoft Windows operating environment, was also installed. Ei Online is an enhanced version of Crosstalk for Windows.

Problems with the equipment set-up continued well into the research, at which point modem consultants visited both Loughborough and Boston Spa. Problems associated with telecommunications were identified at each site. At Loughborough, the Miracom modem did not respond to the old dial tone; and one of the workstation connection cables was faulty. In order to overcome the modem problems, commands were entered manually to connect with Boston Spa. Telecommunications continued to be a problem, especially at the BLDSC, Boston Spa. Eventually, it was possible to transfer order files from Loughborough to Boston Spa, but not transfer scanned document files from Boston Spa to Loughborough.

Initially, requests were selected from the original order files and sent via modem to the BLDSC. It was then discovered that, although the equipment appeared to select items for the final order process, in practice it ordered everything originally saved to the file. To overcome this problem, the selected references were copied into a back-up file, which was then sent to the BLDSC when requesting items for document delivery.

The Ei Reference Desk located at Boston Spa was set up in receive mode, to enable the equipment to accept order files, unfortunately, the equipment 'escaped' from receive mode on a regular basis which restricted the time that orders could be sent. To overcome any problems with the file transfer, both sites synchronised a time of day when orders could be sent and received. The order files were printed out at the BLDSC, and the references were located and should have been sent via the workstation back to Loughborough in the form of electronically scanned files. However, tele-communication problems persisted at BLDSC, although communications improved late afternoon, a connection could not be sustained to send any files to Loughborough. It was then decided to start testing the workstation without document delivery via the workstation. Instead, order files were transferred to the BLDSC via the workstation, and documents were returned to the Pilkington Library's fax machine. Unfortunately, this method did not allow the full document delivery capabilities of the workstation to be tested, and the quality of the returned documents was poor in comparison to the trial documents that had been printed on the laser printer attached to the workstation.

The poor print quality of some of the technical papers received via the Pilkington Library's Group III fax machine, resulted in subsequent deliveries being made through the Library's interlibrary loan van service. Material was photocopied and processed using pre-stamped interloan forms at the BLDSC, and was delivered on a 48 hour basis. At the BLDSC, requests were printed out, and the printouts separated so that individual requests could be attached to British Library request forms. The shelf locations were then checked using the British Library database, the requested items retrieved from the shelves, photocopied, and sent out through the post system.

Further into the research, and as a result of staff changes at BLDSC, material had to be requested via fax, this created more administration regarding requests, and a slower service compared to ordering via the workstation. Subsequently, due to limitations on the number of requests per day, a backlog of requests became evident. Working within a real-life environment, this had further implications for test group members who expected a fast-service.

The system relied heavily on trained personnel and an efficient document supply source. One benefit of electronic document delivery is speed. During the testing of the workstation, it became apparent that no matter how good the Ei Reference Desk is, at the end of the day, somebody is required to fetch material from the shelves at the BLDSC, take a photocopy, then either scan, fax, or post the material back to the user. If the system is to work effectively, it is crucial that adequate support is provided otherwise any possible benefits are lost.

6.5   Ei View

A few test files were available on the workstation at Loughborough, although the transmission of files from the BLDSC was not possible.

The screen images without the zoom feature were difficult to read, but the printed copies of the test articles were very good. The menu options used by Ei View were self explanatory and easy to use. The selection of menu options was via the mouse attachment.

6.6 Summary

There are several features which need to be improved upon if the Ei Reference Desk is to be effectively used in a library environment, but the immediate modifications may differ from those required in a private office situation. The ability to assign a password entry to a workstation of this type is crucial if it is to be used in an open access environment within an organisation. At Loughborough, several problems were encountered because end-users had created inappropriate files on the workstation.

Another important feature of the Ei Reference Desk situated within a library environment, would be access to the library catalogue through the system, and automatic tagging of references available in the library's stock. There is little point in a library ordering material that it already has on-site, and the checking procedures adopted at Loughborough were very time consuming. The ordering process would be significantly improved because the required references could be ordered immediately.

The Compendex Plus CD-ROM database is DOS based and differed from the other facilities because options were selected using the keyboard and not the mouse attachment. After using the other workstation facilities with a mouse, it seemed both strange and slow to have to revert to a keyboard approach. The differences encountered with this facility do not help towards the development of a fully integrated workstation. However, the user interface of Compendex Plus is good, and the majority of users found it easy to use. Users were further impressed with the number of different search options available.

The Page One database operated within the Microsoft Windows environment, and integrated very well with the other workstation facilities. The search option terminology is different from that used by Compendex Plus, and in many cases users required a description of the options available, for instance 'search' was self explanatory, but 'expression' was confusing to most users. The Page One database offered a straightforward order procedure, a similar procedure is required for the transfer of orders from Compendex Plus. The Compendex Plus procedure involved selection of the correct transfer option, record 'tagged' format display, and the typing of file names. This procedure tends to be too complex for the average user, and mistakes could be easily made.

Items selected using Compendex Plus had to be transferred into the order file in 'complete record tagged format', otherwise they would not appear in the order file. When the order files were printed out at the BLDSC, they appeared in the same format, complete with an abstract. This amount of detail was not required by the staff at the BLDSC, only full bibliographic details were required to locate the requested material.

One feature that would enhance the Page One database is a selection of different print options, so that references retrieved through a search conducted using 'expression' can be highlighted and printed when appropriate.

The browse feature offered two menu options, 'Alphabetical Titles' and 'Journal/Issues'. Using the Journal/Issues approach, although no prompt existed, a journal title could be entered and the user moved to the appropriate area in the database. This approach was not available using Alphabetical Titles. This is a useful feature and the Journal/Issues option would benefit from a search prompt, to indicate that the particular option is available.

Unfortunately, the use of both the Ei Online and Ei Order facilities at Loughborough were hampered by equipment set-up problems. In both cases, the default set-up procedures were not used, and connections were made through manual commands and new 'phone book' entries that had to be created. The procedures used at Loughborough were too complicated and unreliable for library users to operate on a service basis. If these facilities were made available to the end-user, both default setting procedures and documentation need to be available. The default settings available on the Ei Reference Desk were appropriate for use in the United States.

The security of search strategies and transferred results should be reviewed, if the Ei Reference Desk is to be operated by more than one designated member of staff. During this research, each test group member had a separate order file arranged by name, and search strategies were saved in the same way. However, there were no further access restrictions placed on individual files, once the users had password access to the Order facility. The system operated on the basis of one individual having password access to the Ei Order facility, whilst any individuals having access to Compendex Plus or Page One could transfer search results over for later transmission.

Overall, there is scope for improvement throughout the Ei Reference Desk. One particular benefit would be a greater integration of all of the workstation facilities. For example, the transfer of search strategies from one facility to another, and the use of similar user interfaces and search terminology. The workstation also needs to be a robust system if faced with library end-users. The problems encountered within the research period will hopefully contribute towards developments within this area.

CHAPTER SEVEN

A COMPARISON BETWEEN DIFFERENT RETRIEVAL OPTIONS AVAILABLE FROM A SINGLE COMMERCIAL SOURCE

7.0 A COMPARISON BETWEEN DIFFERENT RETRIEVAL OPTIONS AVAILABLE FROM A SINGLE COMMERCIAL SOURCE

7.1 Introduction

The main aims of this part of the research were to: compare the printed and electronic sources available to the researcher; and highlight some of the advantages and disadvantages associated with the various retrieval methods. A comparison was also made between the search results retrieved by both the intermediary/librarian, and the researcher/end-user.

Seven retrieval options produced by Engineering Information Inc. were investigated. Out of the seven options, three were associated with CD-ROM Compendex Plus, and two with Engineering Index. The retrieval options are listed below, and all but Engineering Index were available via the Ei Reference Desk.

- CD-ROM Compendex Plus - keyword (additional search option)
  - word/phase
  - Dialog command language
- CD-ROM Page One Database
- Online Compendex Plus
- Engineering Index (print) - alphabetical headings
  - subject index

Eight searches performed by Ei Reference Desk users were selected for comparison, these searches provided a representative sample of those performed on the workstation. The selected search topics are listed below:

- Search 1   River Restoration
- Search 2   Propeller Manufacture
- Search 3   Cloth Cutting
- Search 4   Cement Bentonite Grouts
- Search 5   Canal Leakage
- Search 6   Pelton Wheel Turbines
- Search 7   Handwriting Recognition
- Search 8   Laser Triangulation

The number of search years varied between the eight search topics, however, periods of coverage equivalent to those used by the end-users were adopted during the comparison study. One aspect of this study was to compare the search times of the seven retrieval methods, these times included printing, copying of records, physical removal of volumes from the shelves, and the selection of annual CD-ROM discs. The initialisation sequence of the Ei Reference Desk has not been included within the times stated. The system took approximately one minute and fifty seconds to load the menu screen, from which the search facilities were selected.

In addition to the end-user searches, fifty-six searches were performed by the intermediary. The search results were collated and transferred on to search data forms for later comparison. The search data forms were a modification of those used by Smith (1977) to compare manual and online retrieval systems (see Appendix G). The results of the study are discussed below under the headings of the appropriate retrieval option.

7.2   Compendex Plus CD-ROM:- keyword

Out of the eight searches, five end-users opted for the CD-ROM keyword approach, this facility traced references by a word match approach (see Table 7.1). Although the search strategies included the Boolean connectives of 'and', 'or' and 'not', the easy menu facility included a 'modify search option', which listed additional criteria for selection. Consequently, connectives only had to be typed when using the command language search facility. The end-user search on 'laser triangulation' produced a total of nine references. The terms had been entered side by side and the system looked for a word match. A further search by the intermediary retrieved eighty-four references including the nine already retrieved.

In this search, the term 'laser' was modified with 'triangulation' using the Boolean connective 'and'. This broader search retrieved additional material because the terms did not have to appear side by side, but only within the same record. The additional 'material' included references which could not have been retrieved by the original end-user search strategy, for example 'laser based triangulation'.

In the search for material on 'canal leakage', references were located under 'canal seepage' not 'leakage'. Consequently, the term 'seepage' was incorporated within

the search strategy used to assess the other retrieval options. This highlighted the importance of building a search strategy with the correct terminology.

Several searches included truncation, (for example to allow for plural spelling such as canal or canals), while at the same time limiting the search to disregard the obvious mis-hits. The overall search results retrieved by the end-users compared very well with the intermediary results. In one search, different truncation symbols were used with the intermediary conducting a more refined search strategy. However, the user selected the appropriate material after browsing through the references. The main difference between the end-user and intermediary searching was evident in the recorded search times in Table 7.1.

Table 7.1: Compendex Plus CD-ROM:- keyword search times in minutes (intermediary v end-user)

Type of user	Search number				
	1	3	5	7	8
Intermediary/ Librarian time	20	12	18	16	28
End-user time	90	50	110	60	50

Time =   Search and print time in minutes

Print =   2 minutes per 20 records with full abstracts

One explanation for the difference is that the subject specialists tended to browse the search results, prior to selecting to print. The intermediary searching on behalf of a subject specialist was more likely to scan the results and produce a printout for the specialist. The end-user and intermediary often retrieved the same number of records, but the end-users tended to select a lower number of relevant references for printing. In one search, 39 records were retrieved but only 21 were of particular interest to the researcher. Another explanation was the obvious familiarity the intermediary had with the equipment, selection of commands, and construction of search strategies.

7.3   Compendex Plus CD-ROM:- word/phrase

The Compendex Plus - word/phrase approach comprised an alphabetical list of terms, which originated from terms used within the descriptor fields within individual records. This search option closely relates to the printed approach and is useful to the researcher who is unsure of the correct terminology. To search thoroughly, the researcher needed to think of possible related terms and browse under these headings. One particular search on the workstation involved checking under three different spellings (e.g. real time, realtime, real-time) in order to retrieve all of the relevant material.

Two end-users selected the word/phase option, both the number of references retrieved, and search times were noticeably different to the intermediary's (see Table 7.2). In both cases, specific searches using terms within the search strategies produced few references. Thus, the subject specialists had to look at possible related terms, and browse through the references. In the search for material on 'pelton wheel turbines', the end-user (subject specialist) retrieved thirty references after browsing the word/phrase index. However, the intermediary's search was restricted to specific terms and only one reference was retrieved. In the search for material on 'cement bentonite grouts', the end-user browsed all sub-headings relating to 'cement' and consequently spent fifty minutes retrieving four records.

Table 7.2:   Search times and number of references retrieved

Search number	4	6
End-user search time (minutes)	50	15
Intermediary search time (minutes)	10	5
End-user no. of refs. retrieved	4	30
Intermediary no. of refs. retrieved	0	1

The intermediary conducting the word/phrase search used the same terms. Again, the sub-headings relating to 'cement' were retrieved, but the intermediary required the subject specialist to eliminate irrelevant material from the search. The intermediary's search time was forty minutes less than the end-user's time, but to this would have to be added further time to select references if a positive result was to be achieved (see Table 7.2). This intermediary's search, performed using the CD-ROM keyword search option, retrieved the same four relevant references identified earlier by the end-user in five minutes.

Further investigation revealed that when the search terms were restricted to those used in the original strategies, employing keyword searching, seven of the eight searches employing the word/phrase approach produced less references than the other CD-ROM and online retrieval methods.

7.4 Compendex Plus CD-ROM Dialog command language

The Compendex Plus CD-ROM can be searched using Dialog command language. The command language was used by a number of test group members over the five month test period, but not by the end-users of the eight selected searches. Test group members who did use the command language had no desire to return to the other search options. In order to use this search option, the researcher had to be confident in the application of Boolean logic and truncation symbols.

The number of references retrieved by the intermediary matched all of the searches previously performed using the CD-ROM Compendex Plus keyword approach and online Compendex Plus. The advantage of using Dialog command language in preference to keyword (additional search option) was speed. In most cases, the search by command language was conducted in two-thirds of the time required for keyword searching. The advantages of searching Compendex Plus using Dialog command language on CD-ROM, in preference to online, were mainly related to cost and access.

7.5 Page One CD-ROM database

The Page One CD-ROM database only included bibliographic references for a two year rolling period. Since May 1992, the World Translations Index has also been made available on Page One.

Four of the eight search strategies conducted on the Page One database produced no references. This may be partially due to the disc coverage, but more likely due to the entered search terms not appearing in the title of a reference. The four unsuccessful search strategies each produced less than sixteen references when the other retrieval methods were used. Table 7.3 indicates how many of the Page One retrieved records had already been located using the other retrieval methods.

Table 7.3: Comparison between Page One search results and other retrieval methods

Retrieval method	Search number			
	1	5	7	8
Page One	1	6	5	4
Online Compendex Plus	1	4	5	4
CD ROM Compendex Plus - keyword	1	3	5	4
CD ROM Compendex Plus - word/phrase	0	0	4	1
CD ROM Compendex Plus - Dialog command language	1	4	5	4
Printed Ei-Alphabetical Headings	0	0	0	0
Printed Ei-Subject Index	0	0	3	1

The search for material on 'canal leakage' retrieved an extra two records that did not appear in any of the other retrieval methods under investigation. In the other three searches no extra references were retrieved using the Page One database. Page One is a 'quick-to-use' Windows-based system. Test times for the selected searches varied from the intermediary search of two minutes, to an end-user search of fifteen minutes.

7.6   Online Compendex Plus

This facility was not initially available on the workstation and was consequently only tested by the intermediary. Five of the eight search strategies duplicated records already retrieved using CD-ROM Compendex Plus keyword and CD-ROM Compendex Plus Dialog command language. The three other searches retrieved a smaller number of references, because of the publication year limit applied to the online searches. Using this search method, searches had to be further limited by publication year, otherwise references would have been retrieved for material as far back as 1970 because of the database time span. The CD-ROM discs overlap publication years.

The online search times compared very well with the CD-ROM Compendex Plus Dialog command language times. The main differences between the two systems were associated with cost and access. Online searching involves telecommunication costs, and a charge per downloaded record. A list of titles may be printed free but each citation or abstract costs approximately sixty-five cents.

When using the online method, search times were particularly important because of connection and database charges. The workstation had the facility to store search strategies, and upload the strategy when a connection was made to the database host. The upload option was compared to the online typing of commands once a connection with the database host had been secured. Three searches were uploaded and run concurrently. It took forty seconds for all of the results to be displayed. The same search strategies input by hand, recorded a time of one minute eleven seconds, this also included the display of records.

A further test compared the time of an online search with other retrieval methods. The results of this test are presented in Table 7.4. The connection time through GNS Dialplus to the online Dialog host has not been included in the comparison times. The

terms used in this comparison were 'propeller' and 'manufacture'. In the search for material on 'propeller manufacture' the end-user conducted a title words search, using the same terms, over a six year period. The search time was 120 minutes but no references were retrieved.

Table 7.4: **Online search time compared with the other retrieval methods for Search 2 - Propeller Manufacture**

Retrieval method	Time	No. of references retrieved
Online Compendex Plus	3mins 55secs.	10
Printed Ei - Alphabetical	14mins	1
Printed Ei - Subject Index	23mins	1
CD-ROM Compendex Plus - keyword	12mins	10
CD-ROM Compendex Plus - word/phrase	5mins	1
CD-ROM Dialog Command language	10mins	10
CD-ROM Page One database	2mins	0

It took three minutes and fifty five seconds using online Compendex Plus, to conduct a search and print ten references with full abstracts. The same search was completed in twelve minutes on Compendex Plus CD-ROM keyword, and ten minutes using Compendex Plus CD-ROM Dialog command language. The CD-ROM Compendex Plus Dialog command method was slower than the online version, one reason for this

was that Compendex Plus discs only contained one year of data. Therefore, the discs had to be changed when searching over a number of years.

References retrieved by searching Compendex Plus online could be downloaded onto a file, to be printed off-line on the workstation at a later date. The printing time for ten references was one minute. Another delivery option used by online searchers is the postal delivery service operated by the database host. This study has not been directed towards the costings of search options, further investigations would be required into how the costs of printed sources, workstation equipment, CD-ROM sources, and printer paper, relate to costs of online connection telecommunication charges, and database host charges. Other criteria, including the cost of end-user or intermediary search time, would also need to be addressed.

7.7 Printed Engineering Index (alphabetical headings and subject index)

Manual searches using the printed alphabetical headings approach produced no references in seven of the eight searches.

Manual searches using the printed Engineering Index retrieved very few references in relation to the other non-print sources. Search times ranged from twenty-one minutes to fifty minutes for a five year search. This time included the copying of relevant bibliographical references, but excluded copying abstracts.

Search times for the alphabetical headings approach were faster than the subject index approach, ranging from twelve to thirty-five minutes; it should be noted, however, that no bibliographical references had to be copied in seven of the searches.

7.8 Summary

During the test sessions, one lengthy complicated search could not be run through the CD-ROM Compendex Plus easy menu windows system, because of the insufficient work space. However, the search worked successfully through the CD-ROM Compendex Plus Dialog command option.

The problems associated with the printed source methods, and word/phrase Compendex Plus CD-ROM searching have highlighted the flexibility of keyword searching, the tracing of references by a word match rather than a subject approach. However, for a good keyword search to work effectively, it is essential to build up a search strategy with the correct terminology and word stems. There may be a further requirement to broaden or narrow a particular search by another criteria to prevent mis-hits occurring.

Observations obtained during a study by Charles and Clark (1990) indicated that although 90 per cent of the research participants had searched an online or CD-ROM database within the past year, a significant number had encountered search strategy formulation problems.

The search conducted on 'laser triangulation' also raised concerns surrounding end-user search skill levels. Various studies evaluating online search systems, including those on BRS/After Dark, also support the opinion that end-users encounter difficulties with Boolean logic, appropriate terminology, modification of search strategies, and the evaluation of results (Janke 1984).

Although the end-users are confident about using the equipment, this research has highlighted the need for appropriate training and instructional documentation. The end-users may be satisfied with their search results, but may not have used the retrieval systems to their full potential.

This problem was further highlighted by one user whose search for references was restricted to the Compendex Plus title words option, and subsequently retrieved no references. References on the same topic were later located by the intermediary using the other retrieval options, except on the Page One database.

The Compendex Plus CD-ROM word/phrase retrieval option is ideal for users who wish to browse through specific subject areas. During these tests, it was found that

no more than 75 entries could be selected within a particular search. When using this retrieval method it is important that care is taken with spelling and possible related terms for a comprehensive search.

All of the facilities associated with the Ei Reference Desk performed very well. Page One is particularly useful for up-to-date material, although long search strategies should be avoided because of the database content (i.e. no abstracts are available). Both CD-ROM Compendex Plus easy menu keyword and the CD-ROM Compendex Plus Dialog command language option have proved to be worthy competitors to the online facility, which itself is particularly useful for updating the disc sources.

Throughout the testing of online Compendex Plus, the intermediary encountered problems connecting through GNS Dialplus especially during the busy afternoon period. Delays due to telecommunications make the CD-ROM retrieval methods an attractive option.

CHAPTER EIGHT

CONCLUSIONS AND RECOMMENDATIONS

8.0   CONCLUSIONS AND RECOMMENDATIONS

8.1   Introduction

The main aim of this research, as outlined in Chapter one, was to investigate and evaluate the operation and use of a multifunction engineering information workstation (i.e. the Ei Reference Desk), in an environment where there was already an established information service to relatively sophisticated users. In order to achieve this research, two questionnaires were designed and distributed. It was initially intended to concentrate on test group members, but the sample was increased to also incorporate general library users. The results of the questionnaires were used to evaluate the workstation, as presented and discussed in Chapter five. These were further supplemented with comparison studies involving eight searches performed by Ei Reference Desk users. The results of these comparison studies have been presented in Chapter seven.

The following conclusions and recommendations draw together the main findings of the literature review, questionnaires, equipment observations, and comparison studies, and have been presented in this chapter to reflect the key aspects of the research. Future developments with respect to enhancing the Ei Reference Desk workstation are discussed in the following chapter.

8.2   Optimal operation for various user groups and functions

8.2.1   Conclusions

The Ei Reference Desk provided access to databases focusing on the world's engineering literature, and can be viewed primarily as an engineer's research tool. The workstation was used by two groups during the research period: general library users and test group members. Results show that 97.8 per cent of the test group members, and 62.5 per cent of the general library users required material for current research projects, for example, student projects, outside funded projects and staff research. The success rate of searches indicates the importance of this database within a research environment. However, over half of the references retrieved were not available on site, therefore, the back-up of a suitable document delivery service is required. Depending on the cost of the proposed document delivery service, certain

categories of user within the academic community may be unable to use this facility to its full potential. Costs already restrict the use of the Pilkington Library's online and interlibrary loan services. Within a commercial organisation, there may not be the same restrictions, because costs can be directly linked to a company's future research and development budget, rather than to an individual's.

The workstation was not situated in an open access area of the library because of problems with password entry to modules. However, with instructional documentation and the availability of training sessions, the workstation could be used by all categories of user from the engineering and associated departments. Most users found the Ei Reference Desk 'easy to use', and the majority of test group members were already familiar with the Microsoft Windows software, and search techniques. Some of the general library users performed 'free-text' searches simply to retrieve a few relevant articles from the CD-ROM databases.

The databases were particularly useful for specialised literature searching. Undergraduates tracing material for coursework may find some retrieved references too specialised and not available on-site. In contrast, students researching final year projects may require more specialised information and may have the time and funds available to obtain requests not on-site.

8.2.2   Recommendations

The Ei Reference Desk was particularly suited to the needs of the academic community and specialised research establishments. During the research, most users required information for current research projects and were satisfied with their search results. However, the world-wide scope of the databases presents local access restrictions to full text material. It is therefore recommended that access to a cost-effective electronic document delivery service is established through the Ei Reference Desk. The impact of costs associated with any document delivery system will vary between user groups, and must be assessed before the introduction of such a service. For example, because undergraduates may not be able to afford the cost of ordering documents, they may be unable to use the system to its full potential.

Familiarity with software and search facilities is important in order to ensure optimal operation of the system. Although many staff members had used the Microsoft

Windows software and search techniques before, many of the students had not, thus effective teaching methods need to be introduced for inexperienced users.

User patterns change throughout the academic year: new students are involved in information retrieval courses at the beginning of the year; and finalists require specific information for final year projects during the Spring Term. Within a commercial environment, such fluctuations in demand would not be expected throughout the year. The test group members were evaluated over a relatively short period of time (i.e. five months). In order to assess use patterns of the various client groups, a longer study is required.

In a University Library, the predicted heavy use of the system will be from a wide range of individuals. Within commercial and research organisations, it is expected that key personnel will use the equipment on a regular basis. To cater for the differences that exist between the end-users of the system, the facility to search the databases using different experience levels is an essential feature, which should be enhanced with more help screens.

8.3 Impact upon end-users and the institution

8.3.1 Conclusions

The Ei Reference Desk was used by both staff and students at the University. The increased availability of both CD-ROM and networked databases over the last few years has already had a major impact upon users and the Library. The majority of end-users accepted the Ei Reference Desk as only one source of information and intended to search additional sources before completing their literature review.

All search sessions performed by test group members were successful in retrieving information, and they were impressed by the database coverage. Unfortunately, a large proportion of the references retrieved were not available in the library's stock. The test group members ordered the material that was not available on site. However, because of interlibrary loan charges, some of the Ei Reference Desk general library users were unable to request all of the retrieved material. Compendex Plus and Page One, like many other CD-ROM databases, retrieved very relevant information, but to some users it was also frustrating because the material was not always available in stock, and they could not afford to pay the interlibrary loan charges.

The Ei Reference Desk offered a wide variety of search options. Many end-users were often grateful for any information relating to their search topic and failed to take full advantage of the options available. In some cases, further search strategies would have retrieved more precise information. This has implications for the institution who will need to provide training, documentation, and staffing to ensure end-users can conduct searches successfully.

Institutions are already facing these challenges because of the increasing availability of electronic databases. The incorporation of the Ei Reference Desk or similar systems, would require additional training for library staff. This training must ensure that library staff are proficient in the use of the system software, and can assist users in achieving better database search results.

8.3.2   Recommendations

The Ei Reference Desk proved to be a very popular source of engineering information. Future benefits include access for all users to a major engineering database. The availability of the CD-ROM databases also reduces the number of online searches required for recent material. This research has highlighted the need for education and training to enable library users to improve their search results, through better formulation of search strategies and improved familiarity with the equipment. Recommendations include the production of step-by-step instructional documentation and the provision of end-user and staff training programs.

New electronic databases are targeted towards end-users, consequently, there has been an increase in the number of end-users performing their own searches. This will clearly have an impact upon library services. It is recommended that the institution gives careful consideration to the changing roles of both end-users and staff.

Any new system will require additional staff time. The staffing considerations for this particular system involve: the user assistance requirements; routine maintenance of the equipment; and the possible demands placed on staff to operate the other workstation functions such as Ei Online and Ei Order.

The introduction of workstations can have a considerable financial impact on the institution. Before embarking on such a route the institution should perform a cost-benefit analysis. Some of the additional costs include the purchase of hardware and

software, database charges, technical assistance, maintenance, telecommunications, consumables, and library staff time. The benefits include an enhanced service to a broader spectrum of users, a reduction in search time, and a rapid document delivery service.

Institutions could make financial savings in other areas. For example, initial considerations could include the cancellation of the printed index version, and a reduction in online search time, although there will be a need to maintain a continuous back run of material for historical searches.

The operating cost of the Ei order facility, and the cost effectiveness of a future document delivery service over high speed networks also need to be addressed. The workstation is presently aimed towards engineering information, although access to further databases is available through Ei Online. The present Pilkington Library interlibrary loan service operates for all subject disciplines, therefore, the future integration of the Ei order facility would be seen as an additional service for the engineering faculty. It is essential that institutions consider the cost effectiveness of operating a separate service within the academic environment.

The use of CD-ROM databases increased the number of requests for material not available in stock, but the present cost of interlibrary loans restricts many users from accessing the appropriate documents. Institutions should ensure that new workstations are able to offer a more cost effective service.

Access to documents should also be reviewed. Engineering Information Inc. operate a rapid delivery service in the United States and have immediate access to the material indexed within the database sources. Testing at Loughborough revealed that in some cases documents were not available, and others had to be placed on a waiting list at the BLDSC. With the current developments in telecommunications, the cost of document requests via Engineering Information Inc. should be addressed. Any rapid document delivery service requires the back-up of a comprehensive collection, however, current developments in digitalisation and storage techniques should help to improve the availability of stock for satisfying requests.

8.4   Value for managing information

8.4.1   Conclusions

The Ei Reference Desk's Compendex Plus and Page One databases provided users
with a valuable source of information. The different retrieval methods available from
Engineering Information Inc. were compared. The results of these comparison
studies indicated the potential for CD-ROM databases, when compared to printed
sources. The search times and number of references retrieved, using the CD-ROM
databases, were only challenged by the Ei Online facility.

The two CD-ROM databases can be run as stand-alone systems (see Appendix K, for
prices). The remaining modules of the workstation provide the system's document
delivery capabilities. Results have already highlighted the need for a comprehensive
document supply service, but several factors have to be considered before the
introduction of a new service.

Fjallbrant (1985, p. 533) stated that there were *"three criteria for the evaluation of
document supply services: satisfaction rate, speed of delivery and cost"*. During this
research, there was a 97.7 per cent satisfaction rate from the BLDSC. However, Ei is
a source provider and should hold material to satisfy all requests cited within their
own databases. The Library recently implemented a new interlibrary loan system,
currently most requests are received within a one week period, through the interlibrary
loan van service. Over a four month period, the average time for all of the requests
received from BLDSC has been ten days.

Engineering Information Inc. provide a one hour document delivery service in the
United States via communication networks. The integration of this type of service
would be of great value to the current system. Finally, the cost factor needs to be
addressed. The current standard interlibrary loan charge is £4 for a week to ten days
(approximate) delivery. The cost of a document of up to 20 pages delivered by fax
transmission, for same day delivery using the EiDDS Service, is approximately $36
(see Appendix K). When the £4 charge was introduced at Loughborough University
of Technology (LUT), there was a 30 per cent reduction in demand overall for
interlibrary loans.

In order to assess the value of document delivery via the workstation, the number and
type of users has to be established. Table J.1, in Appendix J, shows that between

August 1991 and July 1992 a total of 6533 departmental requests were processed through the interlibrary loans section. A total of 2255 (34.5 per cent) requests were submitted by engineering and associated departments, and 108 of these requests were for patents. During the year, a further 731 requests were ordered through the Ei Reference Desk. Table J.2 presents the interlibrary loan figures for the period from August 1992 to July 1993, and demonstrates the increased use of this service. The total number of departmental requests for this period increased to 10,721.

8.4.2   Recommendations

The value of the Ei Reference Desk will vary considerably in different organisations. Consequently, the available facilities need to be assessed, and a cost benefit analysis performed against existing services within individual organisations.

The introduction of the service at LUT would enhance the engineering retrieval capabilities and resources available. The ability to retrieve information rapidly also saves the end-users time. The provision of a rapid document delivery service would also inevitably have an impact on the existing interlibrary loan service. However, before the introduction of this service, the cost effectiveness of the provision for administration and distribution of requests would have to be assessed.

The availability of the databases as stand-alone systems highlights the need for the workstation to provide a cost effective document delivery service. Because of the wide range of subject requests received through the interlibrary loan service, the integration of this service must be regarded as a supplementary specialised service. Operating from a library within a large academic community, the emphasis must be on a service offering a comprehensive range of documents for all subject areas, available from a single source. The inclusion of subject specialised services must form part of an integrated interlibrary loan service and be cost effective to operate. Within a purely engineering based institution it may be more cost effective to operate a single document delivery service through the Ei Reference Desk, because of the high concentration of engineering requests. The facility would also help to centralise services. The workstation already incorporates the facility to process and archive orders, and provides billing information. Within this scenario, the workstation becomes an effective one-stop facility for the retrieval and delivery of full text documents.

The direction of future developments will influence the cost of the service. With the ever increasing developments in electronic document delivery, the cost of different delivery options will need to be considered. The development of a cost effective electronic document delivery service is essential if any future system is to maximise its real value to any organisation.

The key to enhancing the potential of such workstations lies in an integrated systems approach to the management of information. For example, a large proportion of staff/user time can be spent checking library catalogues, or transferring data on to other machines. A truly integrated system, incorporating access to the library catalogue, a bibliographic software package, and access through communication networks, would enhance the value of the system within individual organisations.

8.5   Suitability and clarity of the user interface

8.5.1   Conclusions

The Ei Reference Desk comprised five facilities (modules) at Loughborough. The majority of end-users evaluated the two database facilities on the workstation. Depending on the environment in which the workstation is used, the knowledge and skills of the user will vary. At Loughborough, access to order, online and view facilities were restricted to the intermediary. Difficulties were experienced when setting up these facilities, however, the addition of straightforward default parameters could have provided end-users with access to these facilities. The manual settings used at Loughborough were unacceptable for general use.

Both of the CD-ROM databases differ in both search technique and user interface. Page One searches are performed with the aid of a mouse attachment, and Compendex Plus is used via a keyboard. The differences have caused confusion, and system jamming when inappropriate search techniques were used. The lack of integration between the two databases means that literature searches conducted on one database have to be re-entered on the subsequent database using a different interface. Some of the search terminology was unclear on the CD-ROM databases, for example, the Page One option 'expression', and the Compendex Plus disc additional search option 'words and phrases'. After the users received guidance, both of these options were heavily used.

The order procedure through Page One is very easy to follow. However, Compendex Plus lacks this type of procedure, and caused several problems when test group members transferred their own requests. Many of the users were already familiar with Microsoft Windows software, and were therefore familiar with the commands and screen layout.

8.5.2   Recommendations

The Ei Reference Desk operated within a Microsoft Windows environment. In contrast, the Dialog Compendex Plus database is a DOS based program run in conjunction with the Windows facilities. In order to overcome differences in access to facilities by mouse or keyboard, it is recommended that the integration of the Compendex Plus database with the other components of the workstation is improved. Results indicated that the majority of users found the mouse attachment easy to use, and with the increasing use of Windows software for other applications it seems appropriate to use this familiar software in future developments. The procedure to select items to an order file was very easy to follow using the Page One database. A similar procedure is required if end-users are expected to select items using Compendex Plus. Mistakes can be made when using the present transfer system, and incomplete records could be transferred without any warning.

Some of the present search terminology used on the databases needs to be reviewed. The use of similar terminology throughout all of the workstation facilities would be a distinct advantage.

The test period highlighted which search options were favoured by the users. The Compendex Plus additional search option 'words and phrases', which allows keyword searching, was one heavily used option. However, this is an additional option and is not available from the main search option screen. It would be more appropriate if this option was relocated as one of the main search facilities, otherwise, this important facility could remain hidden from many of the system users. The inclusion of the World's Translation Index on the Page One database was very useful, but the current menu's should be revised in order to highlight its availability.

The inclusion of more help screens, and a step-by-step guide or manual with illustrations is also recommended. The workstation comprises a number of different modules, that would benefit with improvements in the linking of modules and the greater integration of systems. A standardised user interface, and the ability to

transfer and use saved search strategies on different modules is highly desirable. Any future software developments should be compatible with the existing systems of the Ei Reference Desk.

8.6 Technical robustness and flexibility

8.6.1 Conclusions

The robustness of any workstation depends upon the amount of use, and the clientele using the equipment. Library workstations are often subjected to heavy use, and many new users will be unfamiliar with the system. Within an office environment, there may be only one trained individual using all of the workstation facilities on a daily basis.

Problems occurred on a regular basis throughout the test period. Frequent errors were reported with jamming on the Compendex Plus database and the CD-ROM disc drive. Long search strategies had to be performed using Dialog command language, because the easy menu approach provided insufficient space. The Ei Order facility encountered problems with file size, which restricted the number of records saved to a particular file. The facility did not forewarn users that this problem existed. Throughout the test sessions, running totals of the number of transferred references had to be logged manually.

The multitasking abilities of windows software allows different modules to run simultaneously. However, there was no facility for running the same search strategies on the different databases without re-entering the search strategy again. The system does have the ability to set up search strategies to run later online, or to save strategies to run on subsequent database searches.

8.6.2 Recommendations

Errors were reported with easy menu searching throughout the research. These difficulties need to be addressed in order to reduce the staff support time required to maintain the system. The problems encountered with the order facility and document delivery option have been detailed earlier in this thesis. It is important that the individual workstations are initially set up within their own working environment.

Many different communication systems are available, and the Ei Reference Desk must have the facility to connect into these systems, and thus needs to be more flexible. At Loughborough, the integration of the Library's OPAC and links through the campus network would be a distinct advantage, as would the integration of a bibliographic software package. Overall improvements are required in the Ei Order facility, problems with both the file size and order transmission were encountered. The order procedure requires default parameters to be pre-set to work within the locality of the workstation.

If the Ei Reference Desk is located in an open access environment, it is recommended that additional security features are developed. For example, access to saved search strategies, and order files should be restricted by password to the individual end-user.

8.7 Effectiveness of document delivery options

8.7.1 Conclusions

Research into the document delivery aspects of the workstation has highlighted areas which require future development work. The proposed document delivery service was envisaged as working on the standard telecommunications network, however, electronic transmission of documents from the BLDSC was not achieved. Earlier research by Tuck (1989) identifies the problems associated with telecommunication networks, which in the past have been adequate for the retrieval of simple bibliographic data but have been far too slow to send large text files.

Orders for documents were sent from Loughborough to Boston Spa via the workstations. Although the order procedure worked, it did not include the use of default settings, and therefore was not appropriate for use by the library end-users. Problems were also encountered with connections to the BLDSC. A specific time of day was synchronised for the transfer of files because the workstation at the BLDSC quitted out of receive mode at regular intervals.

Requests were received in Dialog tagged format at the BLDSC, as this was the only format available for the printing out of requests. A separate document delivery request procedure had to be adopted for all of the Ei Reference Desk requests received via the workstation at the BLDSC.

Requests were initially returned via fax, but the library's fax machine did not produce very clear copies. Future requests were returned via the interlibrary loan van service, and the BLDSC tried to provide a 48 hour service in order to represent a rapid service, similar to that expected via electronic document delivery. However, staff at the BLDSC found it difficult to provide this additional service and request limits were introduced. This had further implications for the service being provided at Loughborough. In some cases, the number of requests created a backlog. It was several days before requests could be ordered, and this subsequently affected the 48 hour delivery of documents. In conclusion, this type of document delivery system would require more manpower at the BLDSC, unless it was incorporated into the established BLDSC order procedure.

The present document delivery system entails the physical retrieval of the paper documents from the shelves, physical photocopying of documents, and then the sending out of requests. In the United States, Engineering Information Inc. provides a one hour service to customers, which would not be possible using the present approach which already involves a high proportion of staff time.

The one hour service provided by Engineering Information Inc. is only for documents that are electronically stored. Testing between Loughborough and the BLDSC proved that using the present system it was difficult to sustain 48 hour document delivery. However, differences exist, Engineering Information Inc. is a specialist within the engineering field of published literature, and is a source provider that has captured images of source documents on CD-ROMs (Arnold 1989). In contrast, the BLDSC is a central core collection with a comprehensive coverage of published material.

The questionnaire results show that all of the test group members had required a fast document delivery service at some point in the past, although only three per cent 'always' required this type of service. A significant proportion of the test group members (39.4 per cent) were also prepared to pay £12 for a rapid document delivery service. Within a commercial environment, demand for a rapid service is expected to be high, but testing within the academic community has also revealed a need for this type of service, and a willingness to occasionally pay a higher price for the service when required.

8.7.2 Recommendations

Rapid developments have taken place over the last couple of years, and new technology in this area has started to have a substantial impact. Developments within high speed telecommunication systems, e-mail, Super JANET, Internet, ISDN and other networks will facilitate the existence of a feasible electronic document delivery service. Consequently, it is recommended that the future transmission of documents via the Ei Reference Desk operates on one of the new high speed networks.

Integration into the present request system at the BLDSC would also produce a more efficient, document delivery service. The BLDSC currently receives requests from customers via post, telex, JANET network, and other associated forms of transmission. The JANET network may be accessed via the University's campus network and through the packet switching service (PSS), thus future requests could be sent through the Automated Request Transmission by Telephone system (ARTTel). Requests via ARTTel are automatically printed on to forms and sorted at the BLDSC. The system has a hit rate of 90 per cent with the software matching the requested journal titles letter-by-letter against the centre's serial database. The requests are printed out in data type batches, i.e. conferences together, and distributed to the appropriate stock areas.

The lack of appropriate Ei Order and Ei Online default settings at Loughborough highlighted the need for appropriate default parameters to be set up at individual workstation sites. The use of default screens would greatly enhance the facilities and enable access to a wider audience if applicable.

The questionnaire results have indicated the need for a fast document delivery service, although a greater demand may have been expected from testing in a commercial environment. To increase the speed of document delivery, recommendations include developments within electronic storage. Engineering Information Inc. are already providing their one hour service in the United States using this type of technology. This type of system will provide a cost effective storage and access procedure. Electronic storage will have a major impact upon world-wide document delivery services as: *"electronic transmission can readily transcend national boundaries, and this opens up the possibility of rapid access to a very wide range of materials - to the world's resources, in fact"* (Line 1984, p. 9).

Requests were initially received via fax from the BLDSC and the quality was poor. The installation of the 'Faxit' module at Loughborough is recommended as a potential improvement, but only if a fax service option is to be pursued. It offers an integrated service and better quality reproduction via a laser printer.

There are significant differences in the Ei Reference Desk service operating through Engineering Information Inc. and the service operated throughout the research with the BLDSC. Recommendation for the future include discussions on the connection of the Ei Reference Desk to the central Engineering Information Inc., or an improved integration with the order procedures adopted at the BLDSC.

Not all of the requests were satisfied by the BLDSC. Some of the requests were received many weeks later because they were already out on loan. Developments within electronic storage and connections to Engineering Information Inc. would help to alleviate this problem.

CHAPTER NINE

FUTURE DEVELOPMENTS

9.0 FUTURE DEVELOPMENTS

9.1 General

The role of libraries is increasingly changing with recent developments in the use of electronic information and the growth of information productivity. Although libraries are moving into electronic information sources, they are still expected to acquire printed material. Libraries are beginning to have a role as an access point to information available not only within the library but from other world-wide sources. Collection building within libraries is also becoming less important and unrealistic in times of financial constraints.

The information society has created the need for people to be able to use information both effectively and efficiently. It is estimated that the volume of information doubles every two and a half years. Electronic document delivery aims to satisfy a market need, however, the growing support for electronic journal publishing may reduce some of its growth prospects. The BLRDD is currently funding an electronic journal project called ELVYN. The project aims to investigate the delivery, in electronic form, of an existing print format journal from a publisher to seven different libraries, and involves the Institute of Physics Publishing Ltd, the Standing Conference of National and University Libraries (SCONUL), and Loughborough University of Technology (Rowland 1993). In reality, there is no problem in retrieving enough information, but selecting the most useful information that will satisfy the end-user's specific needs often proves to be the main challenge.

It was suggested by Ojala (1986, p. 201) that: *"librarians fear that their operations will be transferred from research facilities to warehouses for document delivery to online searchers. Some fear that the arrival of widespread full text databases will make even the warehouse function obsolete"*. However, Harter and Jackson (1988, p. 519) stated that *"much is lost when an expert is replaced by a novice, including the knowledge base and skill of the expert regarding databases"*. Although changes are taking place with new technology, so the information professionals role will change. The teaching of information skills will be one of the challenges in the future.

The new technology currently under development includes digitisation and networking. The digitisation of all types of information will provide new opportunities for the transmission of text, images, speech and sound. The increased

use of networks, and the future developments in high speed networks will enhance the communication channels between researchers. Meadows (1990, p.3) discussed the impact of information technology (IT) on research and stated that: *"IT tends to make research communication more self centred. Earlier work on automated information retrieval enhanced the role of the information intermediary, now the information role of the researcher is becoming increasingly (although not exclusively) important"*.

The supply of primary and secondary information is still on the increase. There has also been a growth in access to databases and library catalogues via communication networks from different parts of the world. Both of these factors will increase the demand for documents and therefore highlight the importance of improved electronic document delivery services. However, there are still issues that need to be resolved regarding document delivery systems. The order procedures need to be straightforward, the bibliographic details need to be complete, and copyright issues have to be addressed, along with pricing arrangements.

The British Library is currently taking part in a project called CITED (Copyright in Transmitted Electronic Documents) (Cornish 1991, 1993). The project is funded by the European Commission and will last for two years. The consortium consists of members from France, Netherlands, Germany, Spain, UK, and Belgium. The aims are to: identify the requirements of end-users of copyright materials; examine the problems which copyright causes; and develop a technical demonstration model to provide a mechanism for central monitoring and access to this field. A model has been designed by the consortium members for the protection of copyright information in digital form, and they are addressing both legal and technical standards. Few publishers wish to prevent access, they would rather control it and receive a payment.

Scott (1992) highlighted the need for copyright fees, and suggested that the main issues will be the method of collection and cost. Her ideal is an electronic store of published documents relevant to a particular subject, with built-in electronic monitoring systems to pay royalties on actual use.

The rapid changes taking place will also affect document delivery services in third world countries. The increasing use of telecommunications and networks for information retrieval and document delivery systems will not be available in the foreseeable future in these countries. With changes in pricing structures, the gap may widen between the "haves" and "have nots". *"Those who can afford to pay for*

documents (and therefore information) will have the knowledge to improve their situation even further; those who have little or no resources to pay for document supply will obtain even less information and therefore be less able to develop their capabilities and change their circumstances" (Cornish 1992, p. 107).

Looking towards the future, Engineering Information Inc. envisage the establishment of an international engineering information network, to facilitate the exchange and dissemination of engineering information world-wide. In order for this to be effective, the above issues have to be addressed along with the development of service standards for the participating nodes within the network.

9.2   Ei Reference Desk

The Ei Reference Desk offers a facility from which access to world-wide engineering literature is available. Rapid document delivery services are already provided in the United States via the Internet network. The design of future systems should consider the differences that exist between the intermediary and the end-user searcher. *"Databases for intermediaries can be constructed and run in a fairly uniform way, whereas database access for end-users must be personalised to the needs of the individual researcher, if it is to be of much value. This means, in turn, that a system aimed at end-users must be capable of self-adaptation"* (Meadows 1990, p. 3). Therefore, system designers must consider who will be the potential users of these systems, and design user interfaces and price structures to reflect their decisions.

The academic community contains many potential system users, although the cost of a workstation may not be justifiable within separate engineering departments. Therefore, future considerations should include the suitability of a central facility located within the library, or the networking of databases and services across the local area network to individuals offices and departmental general access points.

Future possibilities increase with the rapid growth in IT. Developments within personal document delivery via e-mail to individual researcher's offices is possible. However, implications for this in an academic community include the administration of requests and payments. A central facility may still be required from which orders are transmitted and received for distribution via the local area networks.

During this research, document requests had to be physically retrieved from the shelves at the BLDSC, photocopied and then faxed or mailed to Loughborough; a very time-consuming process. On many occasions requests could not be immediately satisfied because the actual documents were already on loan. These requests were entered on a waiting list and satisfied several weeks later.

In 1991, Engineering Information Inc. began to build its own library of journals and conferences, which supports the fulfilment of requests for full text documents. They have also entered into partnerships with publishers to allow the optical scanning of documents. The incorporation of this type of document delivery service is crucial for the development of a one-stop workstation. Future development should include the automatic retrieval of documents, and transmission back to the researcher's workstation. The new developments in optical scanning and imaging technologies will also have a substantial impact on the physical storage of material, access, and the document delivery services.

Speed is one of the main benefits of electronic document delivery. Providing there is adequate telecommunication network access, it can be performed at a rate of a few seconds per page. Another advantage is the ability to deliver documents directly to the end-user and not via an intermediary (for example, BIDS has a document delivery option). However, electronic document delivery depends upon appropriate technology, solutions to copyright issues, and human and institutional issues. In the future, both electronic storage of journal articles, and electronic document delivery will be important issues.

The results of this research indicate that in an academic community there is often a need for a rapid delivery service, although this may be more important within commercial organisations. However, the majority of test group members were not prepared to pay the proposed £12 fee for this type of service. Future developments within these services should take into account the cost implications of new services being offered.

Some database producers (e.g. UMI) have produced full-text articles stored on CD-ROM. These full-text CD-ROMs compliment the bibliographic databases, and offer an alternative option to document delivery. After the initial system costs, only a copyright fee is payable for each article printed. Further investigation is required into the costings of the different systems.

The development of a multifunction workstation requires the integration of systems and services the user may require. A workstation designed specifically for use in a design engineer's office may also require access to CAD/CAM facilities. The incorporation of a personal bibliographic software package such as Procite would be particularly useful within the academic community.

Procite is a database program which organises bibliographic records. The references can be entered manually or can be automatically entered through a Biblio-Links program. The program reformats the records, and edits search statements and messages. Procite offers the database searcher the flexibility to produce a bibliography in the required format from the references retrieved during a search.

The future integration of on-site library holdings would be a distinct advantage. Irrespective of how future document delivery systems operate, requests must first be checked against the on-site library holdings. The integration of library holdings within the Ei Reference Desk facilities would enable the immediate transfer of order requests for documents not available on site.

Overall, the Ei Reference Desk provided valuable access to engineering literature. Future developments to enhance the workstation should include:

- an improved integration of modules and user interfaces;
- access to other packages (e.g. bibliographic software);
- an easy to use and reliable order module;
- the ability to link into existing document supply services and communication networks;
- developments in electronic document delivery;
- competitive document delivery rates; and
- the integration of the library's on-site holdings to provide a one-stop workstation for researchers of the future.

Muller-Schloer and Geiger (1990, p. 718) stated that *"Scientific workstations will play a major role in enhancing the productivity of engineers and scientists in the near future".* While Kaplan (1991, p. 32) stated that *"separate workstation islands will not help engineers compete in technology driven markets. Today, teamwork and concurrent engineering are the important organisational issues, so workstations must be tied together into networks that optimise the use of shared resources".*

Both of these observations have a bearing on the current research although they are predominantly referring to workstations used for engineering applications. An integrated multifunction workstation within a network would have a significant impact on the community, to achieve this the workstation needs to be able to function with different data structures and transfer.

Engineering Information Inc. would like to establish an international network for engineering information exchange and delivery. Future networking facilities should be capable of supporting the transmission of full text documents, data sharing, and e-mail throughout the world. The Ei Reference Desk has the potential to act as a platform for future developments in this area. However, problems with telecommunications access in some third world countries will have an immediate impact on the development of a global network.

REFERENCES AND BIBLIOGRAPHY

REFERENCES

ADAMS, R., 1990. The development of the Dawson Technology/Leicester Polytechnic Librarians' workstation. *In:* C. J. ARMSTRONG and R. J. HARTLEY, eds. *Online information retrieval today and tomorrow.* Oxford: Learned Information; 1990: pp. 113-117.

AMY, S.J., 1985. Teletex based electronic document delivery (Project Hermes). *Journal of Documentation;* Mar. 1985; 41(1): pp. 15-23.

ANDRE, P.Q.J. and EATON, N.L., 1988. National agricultural text digitizing project. *Library Hi Tech;* 1988; 6(3): pp. 61-65.

ARNOLD, S.E., 1989. Document Delivery Cup 1990: Ei 1 away 0. *Advanced Information Report;* Sept. 1989; 11(6): pp. 1-3.

BEECHER, H., 1991. Public access workstations in the library. *Wilson Library Bulletin;* Feb. 1991; 65(6): pp. 52-54.

BIDS and UNCOVER, 1994. BIDS and UnCover agreement opens gateway for HE community. *BIDS/UnCover press release; Mar. 1994.*

BLACK, K., 1989. An integrated workstation for librarians: development and applications. *Library Micromation News;* Sept.1989; (25): pp. 8-11.

BRADBURY, D., 1988. ADONIS - the view of the users. *IFLA Journal;* 1988; 14(2): pp. 132-136.

BRAID, J.A., 1993. Electronic document delivery: a reality at last? *Aslib Proceedings;* June 1993; 45(6): pp. 161-166.

BRITISH LIBRARY, 1992. Document delivery over JANET using X.400 email. *British Library News;* Sept.1992; No. 171: pp. 2.

BRITISH LIBRARY, 1994. Miscellany: BIDS online document ordering system. *Interlending and Document Supply;* 1994; 22(1): pp. 37.

CASORSO, T.M., 1992. NCSU digitized document transmission project: improving access to agricultural libraries. *The Electronic Library*; Oct. 1992; 10(5): pp. 271-273.

CHARLES, S.K. and CLARK, K., 1990. Enhancing CD-ROM searches with online updates: an examination of end-user needs, strategies, and problems. *College and Research Libraries*; July 1990; 51(4): pp. 321-28.

CORNISH, G.P., 1991. CITED: copyright in transmitted electronic text. *Interlending and Document Supply;* 1991; 19(1): pp. 26.

CORNISH, G.P., 1992. Charging for interlibrary loan nationally and internationally. *Interlending and Document Supply;* 1992; 20(3): pp. 102-107.

CORNISH, G.P., 1993. Copyright management of document supply in an electronic age. *Interlending and Document Supply;* 1993; 21(2): pp. 13-20.

COSTERS, L. and KOOPMAN, S., 1993. The Dutch RAPDOC project: from interlibrary loan to electronic document delivery. *Interlending and Document Supply;* 1993; 21(1): pp. 4-6.

DENTON, B., 1992. E-mail delivery of search results via the Internet. *Online*; Mar. 1992; 16(2): pp. 50-53.

DIJKSTRA, J.M.M. and NGU, A.H.H., 1993. Ariadne: a standards compliant and integrated electronic document delivery system. *In:* D. I. RAITT and B. JEAPES, eds. *Online information 93. Proceedings of the 17th international online information meeting*, 7-9 Dec. 1993; London. Oxford: Learned Information (Europe) Ltd.; 1993: pp. 63-76.

DODD, G.H., 1990. A 'SUNny' aspect of an information centre. *Aslib Proceedings*; Oct. 1990; 42(10): pp. 251-256.

ENGINEERING INFORMATION INC., 1991. *Ei Reference Desk user's guide* (draft). New York: Engineering Information Inc.; 1991.

FAIBISOFF, S. and HURYCH, J., 1981. Is there a future for the end user in online bibliographic searching? *Special Libraries*; Oct. 1981; 72(4): pp. 347-355.

FJALLBRANT, N., 1985. What the user wants in a document delivery service. *In: 8th international online information meeting*, 4-6 Dec. 1984; London. Oxford: Learned Information Inc.; 1985: pp. 533-539.

FOWLER, F.J., 1984. *Survey research methods.* Rev. ed. London: Sage Publications Inc.

GATES, Y., 1983. User needs and technology options for electronic document delivery. *Aslib Proceedings;* Apr. 1983; 35(4): pp. 195-203.

GOLDFINCH, R., 1990. The impact of end-user searching of CDROM on online use. *In:* C. J. ARMSTRONG and R. J. HARTLEY, eds. *Online information retrieval today and tomorrow.* Oxford: Learned Information Ltd; 1990: pp. 75-83.

HAINES, J.S., 1982. Experiences in training end-user searchers. *Online*; Nov. 1982; 6(6): pp. 14-23.

HARER, J.B., 1992. Information delivery in the evolving electronic library: traditional resources and technological access. *Collection Management;* 1992; 17(1/2): pp. 77-91.

HARMAN, J., 1986. Reuters: a survey of end-user searching. *Aslib Proceedings*; Jan. 1986; 38(1): pp. 35-42.

HARTER, S.P. and JACKSON S.M., 1988. Optical disc systems in libraries: problems and issues. *RQ*; Summer 1988; 27(4): pp. 516-527.

HAWKINS, D.T., 1992. Technotrends: document delivery gets personal. *Online*; May 1992; 16(3): pp. 106-108.

HOINVILLE, G., JOWELL, R. and ASSOC., 1985. *Survey research practice.* London: Gower.

JACKSON, M. E., 1993. Document delivery over the Internet. *Online*; Mar. 1993; 17(2): pp. 14-21.

JANKE, R.V., 1984. Online after six: end user searching comes of age. *Online*; Nov. 1984; 8(6): pp. 15-29.

JOINT FUNDING COUNCILS, 1993. *Joint Funding Councils' Libraries Review Group: Report.* Bristol: HEFCE.

KAPADIA, R. and ANDERSSON, G., 1987. *Statistics explained: basic concepts and methods.* Chichester: Ellis Horwood.

KAPLAN, G., 1991. Revolution in the workplace, *IEEE Spectrum*; Apr. 1991: pp. 32.

KHALIL, M. 1993. Document delivery: A better option? *Library Journal;* Feb. 1993; 118(2): pp. 43-47.

KORWITZ, U., 1990. ADONIS - between myth and reality: trial document supply using CD-ROM technology. *IFLA Journal*; 1990; 16(2): pp. 215-219.

LANDAU, H.B., 1984. Engineering Index 1884-1984: Its service to special libraries. *Special Libraries*; Oct. 1984; 75(4): pp. 312-318.

LEACH, R.G. and TRIBBLE, J.E., 1993. Electronic document delivery: new options for libraries. *Journal of Academic Librarianship*; 1993; 18(6): pp. 359-364.

LENZINI, R.T. and SHAW, W., 1992. UnCover and UnCover 2: An article citation database and service featuring document delivery. *Interlending and Document Supply*; 1992; 20(1): pp. 12-15.

LINE, M.B., 1984. Resource sharing: the present situation and the likely effect of electronic technology. *In:* N. FJALLBRANT, ed. *The future of serials: publication, automation and management. Proceedings of the 10th meeting of IATUL,* 6-10 June 1983; Essen. Goteborg: IATUL; 1984: pp. 1-11.

LUCIER, R.E., MATHESON, N.W., BUTTER, K.A. and REYNOLDS, R.E., 1988. The knowledge workstation: an electronic environment for knowledge management. *Bulletin of the Medical Library Association;* July 1988; 76(3): pp. 248-255.

MASTRODDI, F.A., 1988. Experiments in electronic publishing and document delivery: results of the EEC's Docdel programme. *Interlending and Document Supply*; 1988; 16(4): pp. 121-128.

McCONE, G.K. and STARR, D.O., 1990. Document delivery using image transmission over Internet: a pilot project at the National Agricultural Library. *In:* D. HENDERSON, ed. *ASIS '90. Information in the year 2000: from research to applications. Proceedings of the 53rd annual meeting of the American Society for Information Science*; 4-8 Nov. 1990; Toronto. Medford, New Jersey: Learned Information Inc.; 1990: pp. 36-38.

MEADOWS, A.J., 1990. General overview - keynote address. *In:* M. FEENEY and K. MERRY, ed. *Information technology and the research process.* Proceedings of a conference held at Cranfield Institute of Technology, UK, 18-21 July 1989. London: Bowker Saur; 1990: pp. 1-13.

MICCO, M. and SMITH, I., 1989. Designing a workstation for information seekers. *Reference Librarian*; 1989; 23: pp. 135-152.

MILL, J., 1993. Knowledge sans frontieres. *New Scientist;* 6th. Nov. 1993: pp. 24-27.

MITCHELL, J., 1993. OCLC interlending and document supply services. *Interlending and Document Supply;* 1993; 21(1): pp. 7-12.

MORAN, B.B., SURPRENANT, T.T. and TAYLOR, M.E., 1987. The electronic campus: The impact of the scholar's workstation project on the libraries at Brown. *College and Research Libraries*; Jan. 1987; 48(1): pp. 5-16.

MULLER-SCHLOER, C.H. and GEIGER, M., 1990. The Euroworkstation Project and its future extensions. *In:* COMMISSION OF THE EUROPEAN COMMUNITIES DIRECTORATE - GENERAL TELECOMMUNICATIONS, INFORMATION INDUSTRIES AND INOVATION, ed. *Esprit '90. Proceedings of the annual Esprit conference,* 12-15 Nov. 1990; Brussels. Dorkecht: Kluwer Academic; 1990: pp. 718-731.

NORMAN, A.R.D., 1982. *Electronic document delivery, the Artemis concept for document digitalisation and teletransmission, a study prepared for the Directorate-General Information Market and Innovation.* Commission of the European Communities, New York, Knowledge Industry Publications.

OJALA, M., 1986. Views on end-user searching. *Journal of the American Society for Information Science*; 1986; 37(4): pp. 197-203.

Oxford Dictionary of Computing. 1991. 3rd ed. Oxford: Oxford University Press.

PEMBERTON, H., 1992. The Printout: Ei and Dialog form new document delivery supply company. *Online;* 1992; 16(5); pp. 11.

PEMBERTON, H., 1994. The Printout: BIOSIS launches document delivery service. *Online;* 1994; 18(1): pp. 11.

PRESS, L., 1992. The Net: progress and opportunity. *Communications of the ACM;* Dec. 1992; 35(12): pp. 21-25.

RAITT, D.I., 1985. Apollo: document delivery by satellite. *In:* C. A. PARKHURST, ed. *ASIS '85. Proceedings of the 48th ASIS annual meeting,* 20-24 Oct. 1985; Las Vegas. New York: Knowledge Industry Publications; 1985: pp. 7-10.

RAITT, D.I., 1992. News: Increased order turnaround at ISI. *Online Review;* Dec. 1992; 16(6): pp. 420.

REGAZZI, J.J., 1990. Designing the Ei Reference Desk. *In:* M. WILLIAMS, ed. *National online meeting. Proceedings of the 11th national online meeting,* 1-3 May 1990; New York. Medway, NJ: Learned Information Inc.; 1990: pp. 345-347.

RICHARDSON, R.J., 1981. End-user online searching in a high-technology engineering environment. *Online*; Oct. 1981; 5(4): pp. 44-57.

ROSENBERG, V., 1989. Desktop research and software connectivity. *Library Hi Tech;* 1989; 7(4): pp. 85-88.

ROWLAND, F., 1993. Electronic delivery of research information. *Serials;* Nov. 1993; 6(3): pp. 40-50.

SCHULTZ, K. and SALOMON, K., 1990. End users respond to CDROM. *Library Journal*; 1990; 115(2): pp. 56-57.

SCOTT, E.J., 1992. Meeting the information scientist's needs. *Learned Publishing;* 1992; 5(3): pp. 145-151.

SHACKEL, B. and PULLINGER, D.J., 1984. *BLEND - 1. Background and developments. Library and Information Research Report 29.* London: The British Library.

SHIPP, W.S., MEYROWITZ, N. and VAN DAM, A., 1983. Networks of scholar's workstations in a university community. *In: COMPCON '83. Delivering computer power to end-users. Proceedings of the 27th Computer Society international conference,* 25-29 Sept.1983; Arlington VA. Piscataway, NJ: IEEE, 1983, pp. 108-122.

SIEGFRIED, S., BATES, M.J. and WILDE, D.N., 1993. A profile of end-user searching behaviour by humanities scholars: the Getty online searching project report No. 2. *Journal of the American Society for Information Science;* 1993; 44(5): pp. 273-291.

SMITH, R.G., 1977. Before you scrap the old ways, compare retrieval systems. Manual Vs. Online. *Online;* Apr. 1977; 1(2): pp.26-27, 51-59.

SOULE, J., 1987. Transdoc, European programme for electronic storage and document delivery. *In:* A. H. HELAL and J. W. WEISS, eds. *International library cooperation. 10th anniversary Essen symposium;* 19 -22 Oct. 1987; Essen. Essen: Universitatsbibliothek Essen; 1987: pp. 264-273.

SPSS Inc., 1986. *SPSS-X User's Guide.* Chicago, SPSS Inc.

THOMA, G.R. and WALKER, F.L., 1990. A prototype electronic document delivery system. *In:* D. HENDERSON, ed. *ASIS '90. Information in the year 2000: from research to applications. Proceedings of the 53rd annual meeting of the American Society for Information Science;* 4-8 Nov. 1990; Toronto. Medford, NJ: Learned Information Inc.; 1990: pp. 29-35.

TIEFEL, V., 1993. The gateway to information: the future of information access today. *Library Hi Tech;* 1993; 11(4): pp. 57-65, 74.

TILLMAN, H.N., 1993. The Internet - use it now. *Specialist: the newsletter of the Special Libraries Association;* Mar. 1993; 16(3): pp. 3.

TORKAZADEH, G. and DOLL, W.J., 1993. The place and value of documentation in end-user computing. *Information and Management;* 1993; 24: pp. 147-158.

TROLL, D.A. and RICHARDS, B.G., 1992. From vision to reality: implementing the distributed electronic library. *In:* D. SHAW, ed. *ASIS '92. Proceedings of the 55th annual meeting of the American Society for Information Science,* 26-29 Oct. 1992; Pittsburgh, USA. Medford, New Jersey: Learned Information Inc.; 1992: pp. 144-149.

TUCK, B., 1986. Quartet : a collaborative research project in digital information interchange. *Vine;* Aug. 1986; 63: pp. 36-41.

TUCK, B., 1989. Integrated document delivery systems: the APOLLO, ADONIS and QUARTET experiments. *Netlink;* 1989; 5(1): pp. 5-8.

UNIVERSITY GRANTS COMMITTEE, 1976. *Capital provision for university libraries. Report of a working party;* London: HMSO.

VERNIMB, C., 1984. The CEC's role in the promotion of electronic document delivery in Europe. *IATUL Proceedings;* 1984; 16: pp. 91-97.

VERNIMB, C., 1985. Apollo - a catalyst for full text delivery in Europe. *In: 8th international online information meeting,* 4-6 Dec. 1984; London. Oxford: Learned Information Inc.; 1985: pp. 541-545.

WALTON, K.R. and DEDERT, P., 1983. Experiences at Exxon in training end-users to search technical databases online. *Online;* Sept. 1983; 7(5): pp. 42-50.

WANGER, J., CUADRA, C.A., FISHBURN, M., 1976. *Impact of online retrieval services: A survey of users 1974-75;* Santa Monica: SDC.

BIBLIOGRAPHY

ADAMS, R., 1985. Development of the automation of interlending by microcomputer (AIM) system at Leicester Polytechnic. *Program;* Jan. 1985; 19(1): pp. 48-58.

ADAMS, R., 1990. The Dawson technology librarians' workstation. *Aslib Proceedings*; Oct. 1990; 42(10): pp. 271-275.

AGARD (Advisory Group for Aerospace Research and Development), 1988. *Evaluating the effectiveness of information centres and services* . (AGARD Lecture Series 160). Neuilly sur Seine France: AGARD.

ALLOWAY, J., 1992. Dialog OnDisc Compendex Plus. *CD-ROM Librarian*; Apr. 1992; 7(4): pp. 30-33.

ALRECK, P.L. AND SETTLE, R.B., 1985. *The survey research handbook.* Homewood, Illinois: Richard D. Irwin Inc.

ALWIN, D.F., 1978. *Survey design and analysis: current issues.* Beverley Hills, USA: Sage Publications.

ANDENY, M.L., 1991. Evaluating end-user services: success of satisfaction. *The Journal of Academic Librarianship*; 1991; 16(6): pp. 352-356.

APOLLO Working Group, 1983. *The APOLLO concept. Electronic document delivery by satellite.*(Series ESA SP-1048). Netherlands: ESA Scientific and Technical.

ARNOLD, K., COLLIER, M. and RAMSDEN, A., 1993. ELINOR: The electronic library project at De Montford University, Milton Keynes. *Aslib Proceedings;* Jan. 1993; 45, (1): pp. 3-6.

BERGER, M.C., 1989. Engineering Information Workstation. *In: National online meeting. Proceedings of the 10th national online meeting, 9-11* May 1989; New York. Medway, NJ, Learned Information; 1989: pp. 33-35.

BISHOP, A.P., 1992. Electronic communication in engineering work. *In: D. SHAW*, ed. *ASIS '92. Proceedings of the 55th annual meeting of the American Society for Information Science,* 26-29 Oct. 1992; Pittsburgh, USA. Medford, New Jersey: Learned Information Inc.; 1992; pp. 193-205.

BISSELL, T.A., 1969. *The Engineering Index story* (1884-1969). New York: Engineering Index.

BLACK, K., 1990. The development of IWS - an integrated workstation for librarians. *Program*; Jan. 1990; 24(1): pp. 49-58.

BRAID, A., 1988. Developments in electronic document storage and transmission at the British Library Document Supply Centre. *ITS News*; Jan. 1988; (15): pp. 20-26.

BRAID, A., 1989. Document delivery - the dawn of a new era. *IATUL Quarterly*; 1989; 3(4): pp. 207-213.

BRAID, A., 1990. Group 4 fax-facsimile transmission for document delivery. Paper presented at the 13th Annual UKSG Conference. *Serials;* 1990; 3(3): pp. 29-32.

BRINDLEY, L., 1988. Linking systems locally: the 'wired campus' and its relevance. *In:* V. HORSNELL, ed. *Mechanisms for library cooperation: getting our act together. Proceedings of the 13th annual seminar of the Marc Users Group,* 1988. Aldershot: Gower; 1988: pp. 46-57.

BRINDLEY, L.J., ed., 1989. *The Electronic Campus: an information strategy. Library and Information Research Report 73.* London: The British Library.

BRODY, R., 1993. End-users in 1993: after a decade. *Online;* May 1993; 17: pp. 66-69.

BROPHY, P., 1990. Introduction to the use of workstations for library and information management. *Aslib Proceedings*; Oct. 1990; 42(10): pp. 245-250.

BROWN, D.J., 1993. Current awareness and document delivery: the changing market. *Serials*; Nov. 1993; 6(3): pp. 29-39.

BURRIS, R. and MOLINEK, F., 1991. Establishing and managing a successful end-user search service in a large special library. *Online*; Mar. 1991; 15(2): pp. 36-39.

BYSOUTH, P.T., 1990. *End-user searching: the effective gateway to published information*. London: Aslib.

CAWKELL, A.E., 1991. Electronic document delivery systems. *Progress in Documentation*; 1991; 47(1): pp. 41-73.

CREPS, J.E. and CARRIGY, J.W., 1972. The engineer's worldwide transdisciplinary information service. *Sci-Tech News*; 1972; 26(2): pp. 42-44.

DAWSON GROUP UK., 1989. The integrated workstation from Dawson Technology. *Vine;* Oct. 1989; (75): pp. 20-24.

DESCHAMPS, C., 1991. Foudre - electronic access to documents in the french academic community. *Interlending and Document Supply;* 1991; 19(4): pp. 127-137

DOUGHERTY, R.M. and DOUGHERTY, A.P., 1993. The academic library: a time of crisis, change, and opportunity. *The Journal of Academic Librarianship*; 1993; 18(6): pp. 342-346.

DYER, H., 1990. The effects of CD-ROM on library services. *Health Libraries Review*; 1990; 7(4): pp. 196-203.

ELCHESSEN, D.R., 1978. Cost-effectiveness comparison of manual and on-line retrospective bibliographic searching. *Journal of the American Society for Information Science*; Mar. 1978; 29(2): pp. 56-66.

ENGINEERING INFORMATION INC., 1991. EI releases two new subsets of Compendex*Plus. *CD-ROM Librarian*; June 1991; 6(6): pp. 35-36.

EVANS, A.J., RHODES, R.G. and DAVIES, J.E., 1991. *The 'Workstation' or 'Reference Desk ' approach to information provision*. Unpublished proposal for research project submitted to BLRDD, Feb. 1991.

FARIES, C., 1992. Users' reactions to CD-ROM: the Penn State experience. *College and Research Libraries*; Mar. 1992; 53(2): pp. 139-149.

FINZI, C. ET AL, 1983. Transdoc. *In: 7th international online information meeting*, 6-8 Dec. 1983; London. Oxford: Learned Information Inc.; 1983: pp. 383-391.

GARMAN, N.J. and PASK, J.M., 1985. End-user searching in business and management. *In: National online meeting: proceedings*, 30 Apr- 2 May 1985; Oxford: Learned Information Inc.: pp. 161-165.

GEORGE, L.A., 1993. Fee-based information services and document delivery. *Wilson Library Bulletin;* Feb. 1993; 67(6): pp. 41-44.

GRAHAM, P.S., 1990. Electronic information and research library technical services. *College and Research Libraries*; May 1990; 51(3): pp. 241-250.

GUNNING, K., MYERS, J.E. and BAILEY, C.W., 1993. Networked electronic information systems at the University of Houston Libraries: The IRIS project and beyond. *Library Hi Tech;* 1993; 11(4): pp. 49-55.

HANCOCK-BEAULIEU, M., 1990. Methods for evaluation OPACs. *Library and Information Research News*; Spring 1990; 13(47): pp. 20-30.

HANNUM, J.E., 1930. *History of the Engineering Index.* New York: Engineering Index.

HARRIS, G. 1990. The user interface to online information. *In:* D. I. RAITT, ed. *Online information 90. 14th international online information meeting proceedings*, 11-13 Dec.1990; London. Oxford: Learned Information; 1990: pp. 319-324.

HOFFMAN, J., 1988. Creating a CD-ROM/PC reference workstation. *CD-ROM Librarian*; Feb. 1988; 3(2): pp. 17-20.

HOLLAND, M.P., 1984. Communications software: experiences with Perfect Link and Crosstalk XVI. *Online*; July 1984; 8(4): pp. 75-80.

HOLLAND, M.P. ET AL., 1991. Engineers as information processors: a survey of US aerospace engineering faculty and students. *European Journal of Engineering Education*; 1991; 16(4): pp. 317-336.

HURD, J.M., WELLER, A.C. and CURTIS, K.L., 1992. Information seeking behaviour of faculty: use of indexes and abstracts by scientists and engineers. *In:* D. SHAW, ed. *ASIS '92. Proceedings of the 55th annual meeting of the American Society for Information Science,* 26-29 Oct. 1992; Pittsburgh, USA. Medford, New Jersey: Learned Information Inc.; 1992: pp. 136-143.

HURT, C.D., 1983. Intermediaries, self searching and satisfaction. *In:* M. E. WILLIAMS and T. H. HOGAN, eds. *National online meeting. Proceedings of the fourth national online meeting,* 12-14 Apr. 1983; New York. Medford, New Jersey: Learned Information Inc.; 1983: pp. 231-237.

IKEDA, N.R., 1992. Impact of end-user search training on pharmacy students: a four-year follow-up study. *Bulletin of the Medical Library Association*; Apr. 1992; 80(2): pp. 124-130.

JACKSON, P., 1990. The ideal CD-ROM workstation for the 1990's. *In:* D. I. RAITT, ed. *Online information 90. 14th international online meeting proceedings*; 11-13 Dec. 1990; London. Oxford: Learned Information; 1990: pp. 25-32.

JACKSON, M. E., 1992. Using Ariel, RLG's Document Transmission System to improve document delivery in the United States. *Interlending and Document Supply;* 1992; 20(2): pp. 49-52.

JACKSON, M. E., 1993. Resource sharing and document delivery in the 1990's: new options for libraries. *Wilson Library Bulletin*; 1993; 67(6): pp. 35-6, 110.

JANKE, R.V., 1983. BRS/After dark: the birth of online self-service. *Online*; Sept.1983; 7(5): pp. 12-29.

LANCASTER, F.W., 1977. *The measurement and evaluation of library services.* Washington, DC: Information Resources Press.

LANDAU, H.B., 1983. The future of Ei as a secondary service: toward an engineering information supermarket. *In:* K. R. BROWN, ed. *The challenge of*

information technology. Proceedings of 41st FID Congress.(FID Pub 662), 13-16 Sept.1982; Hong Kong. Amsterdam: North-Holland; 1983: pp. 319-324.

LARGE, J.A., 1989. Evaluating online and CD-ROM reference sources. *Journal of Librarianship;* Apr. 1989; 21(2): pp. 87-108.

LAW, D.G., 1991. The impact of CD-ROM on the end-user. *International Cataloguing and Bibliographic Control;* Jan./Mar. 1991; 20(1): pp. 7-9.

LEVY, L.R., 1984. Gateway software: is it for you? *Online;* Nov. 1984; 8(6): pp. 67-79.

LEWIS, M., 1989. Experiences with CD-ROM in a university library. *In: SCIL'89 international. Proceedings of the third annual conference on small computers in libraries,* Feb. 1989. London: Meckler; 1989: pp. 133-136.

LINE, M.B., 1983. Document delivery, now and in the future. *Aslib Proceedings;* 1983; 35(4): pp. 167-176.

LINE, M.B., 1985. National planning and the impact of electronic technology on document provision and supply. *Libri;* 1985; 35(3): pp. 181-190.

LINE, M.B., 1989. The future of CD-ROMs for full text of journals. *In:* A. H. HELAL and J. W. WEISS, eds. *The impact of CD-ROM on library operations and universal availability of information. 11th international Essen symposium;* 26-29 Sept.1988; Essen. Essen: Universitatsbibliothek Essen; 1989: pp. 189-97.

LITTLEJOHN, A.C., 1987. End-user searching in an academic library- the students' view. *Research Quarterly;* 1987; 26(4): pp. 460-466.

LITTLEJOHN, A.C. and PARKER, J.M., 1988. Compact disks in an academic library: developing an evaluation methodology. *Laserdisk Professional;* May 1988; 1(1): pp. 36-43.

LYON, E., 1989. MEDLINE-for-Medics: an online searching course for health-care professionals. *Health Libraries Review;* 1989; 3(6): pp. 141-149.

LYON, E., 1990. Is there a future for the intermediary? *In:* C. J. ARMSTRONG and R. J. HARTLEY, eds. *Online information retrieval today and tomorrow.* Oxford: Learned Information Ltd; 1990: pp. 119-129.

MANGRUM, R., 1990. Networking information products on campus: area network and campus broadband. *In:* D. HENDERSON, ed. *ASIS '90. Information in the year 2000: from research to applications. Proceedings of the 53rd annual meeting of the American Society for Information Science,* 4-8 Nov. 1990; Toronto. Medway, NJ: Learned Information Inc.; 1990: pp. 279-283.

MARK, N., 1989. Electronic document delivery and electronic publishing. Experiments supported by the Commission of the European Communities. *Libri*; 1989; 39(2): pp. 165-169.

MARTIN, S.K., 1984. The impact of technology on interlibrary lending. *Interlending and Document Supply*; Apr. 1984; 12(2): pp. 47-51.

MARTYN, J., 1987. *Literature searching habits and attitudes of research scientists. British Library Research Paper 14.* London: The British Library.

MASTRODDI, F.A., 1984. The development of electronic document delivery and electronic publishing in the European Community. *Interlending and Document Supply*; 1984; 12(4): pp. 129-136.

MASTRODDI, F.A., 1985. Integrated electronic publishing - some pointers for the future. *In: 8th international online information meeting,* 4-6 Dec. 1984; London. Oxford: Learned Information Inc.; 1985: pp. 179-194.

McKNIGHT, C., 1990. Workstations for academic applications. *Aslib Proceedings*; Oct. 1990; 42(10): pp. 263-269.

McKNIGHT, C., 1993. Electronic Journals: past, present and future? Aslib Proceedings; Jan. 1993; 45(1): pp. 7-10.

McQUEEN, H., 1990. Networking CD-ROMS: implementation considerations. *Laserdisk Professional*; Mar. 1990; 3(2): pp. 13-16.

MEYER, R.R., 1988. Customer experience with dialog ondisc: a user survey. *Laserdisk Professional*; May 1988; 1(1): pp. 62-65.

MICCO, M. and SMITH, I., 1987. Designing an integrated system of databases: a workstation for information seekers. *Library Software Review*; Sept.-Oct. 1987: pp. 259-262.

MICHEL, J., 1991. The strategic management of information: an essential element in the training of engineers. *IATUL Quarterly*; 1991; 5(1): pp. 25-32.

MURO, E.A. and KUHN, J.M., 1988. Optical solutions for electronic transfer. *In: Online information 88. Proceedings of the 12th international online information meeting*, 6-8 Dec. 1988. Oxford: Learned Information; 1988: pp. 543-ed. 3.

NICHOLAS, D., ERBACH, G., and HARRIS, K., 1987. End users: threat, challenge or myth? *Aslib Proceedings*; 1987; 39(11/12): pp. 337-344.

NICHOLAS, D., ERBACH, G., and HARRIS, K., 1987. Online: views on costs and cost-effectiveness. *Journal of Information Science*; 1987; 13: pp. 109-105.

NICHOLAS, D., PANG, Y.W., ERBACH, G. and PALMAN, K., 1987. End-users in higher education: the British experience. *British Journal of Academic Librarianship*; 1987; 2(2): pp. 105-126.

NOLTE, J., 1990. The electronic library workstation - today. *Computers in Libraries*; Oct. 1990; 10(9): pp. 17-20.

NORUSIS, M.J., 1982. *SPSS introductory guide: basis statistics and operations*, Chicago: SPSS Inc.

OPPENHEIM, A.N., 1966. *Questionnaire design and attitude measurement*. London: Heinemann.

ORCHARD, C., 1988. ADONIS and electronically stored information: an information broker's experience. *Serials Librarian*; 1988; 15(3/4): pp. 85-91.

OVENS, C.S.H., 1988. The electronic workstation at an academic library for one-stop information retrieval. *In: Online information 88. Proceedings of 12th international online information meeting,* 6-8 Dec. 1988. Oxford: Learned Information; 1988: pp. 495-506.

PAGE, J.R.U., 1987. Cost evaluation in the DOCDEL experiments. *In:* F. MASTRODDI, ed. *Electronic publishing: the new way to communicate. Proceedings of a symposium held in Luxembourg on electronic publishing,* 5-7 Nov. 1986; Essen. London, Kogan Page; 1987: pp. 87-95.

PALMER, T., 1986. Length of journal articles: implications for electronic document delivery. *Interlending and Document Supply;* 1986; 14(2): pp. 50-54.

PLASSARD, M.F., 1989. The impact of new technology on document availability and access. *Interlending and Document Supply;* 1989; 17(1): pp. 3-10.

RAITT, D.I., 1987. Communication channels and networks: facilitating information transfer and exchange. *In:* A. H. HELAL and J. W. WEISS, eds. *International library cooperation. 10th anniversary Essen symposium,* 19-22 Oct. 1987; Essen. Essen: Universitatsbibliothek Essen; 1987: pp. 306-325.

RAVDEN, S., 1989. *Evaluating usability of human computer interfaces: a practical method.* Chichester: Ellis Horwood Ltd.

REGAZZI, J.J., 1989. Reference Desk - the electronic library. *Newsidic;* Oct. 1989; (97): pp. 2-4.

REGAZZI, J.J., 1989. New technologies and information delivery systems. *In: Online information 89. Proceedings of the 13th international online information meeting,* 12-14 Dec. 1989; London. Oxford: Learned Information; 1989: pp. 331-336.

REGAZZI, J.J., 1990. Engineering Information - a changing resource. *FID News Bulletin;* Mar. 1990; 40(3): pp. 48-51.

REGAZZI, J.J., 1992. Bringing the engineering library to the desktop. *ICSTI Forum;* Mar. 1992; (9): pp. 6.

REGAZZI, J.J., 1992. User driven: the evolution of the Ei Reference Desk. *Library Hi Tech;* 1992; 10(4): pp. 81-84.

RICHARDSON, S. and STRATTON, L., 1994. Providing the "Best Possible Access". *Online;* 1994; 18(1): pp. 66-70.

ROSENBERG, V., 1990. Desktop research - information management for the scholar. *In: Next decade in information technology. Proceedings of the fifth Jerusalem conference on information technology,* 22-25 Oct. 1990. Los Alamitos, Ca., USA: IEEE Computer Society Press; 1990: pp. 639-642.

RUSSON, D., 1987. New modes of communication electronic document delivery. *In:* S. FROST, ed. *Serials '87. Proceedings of U.K. Serials Group conference,* 30 Mar. - 2 Apr. 1987; University of Oxford. Oxford: U.K. Serials Group; 1987: pp. 60-65.

SALOMON, K., 1988. The impact of CD-ROM on reference departments. *Research Quarterly;* Winter 1988; 28: pp. 203-219.

SALOVAARA, I., 1988. Experiences in end-user and intermediary searching at the technical research centre of Finland(VTT). *In: Online information 88. Proceedings of 12th international online information meeting,* 6-8 Dec. 1988; London. Oxford: Learned Information Inc.; 1988: pp. 103-110.

SCHWARZWALDER, R., 1989. Compendex*Plus improvements in engineering's premiere database. *Database;* Aug. 1989; 12(4): pp. 79-84.

SEWELL, W. and TEITELBAUM, S., 1986. Observations of end-user online searching behavior over eleven years. *Journal of the American Society for Information Science;* 1986; 37(4): pp. 234-245.

SHENOUDA, W., 1990. Online bibliographic searching: how end users modify their search strategies. *In:* D. HENDERSON, ed. *ASIS '90. Information in the year 2000: from research to application. Proceedings of the 53rd annual meeting of the American Society for Information Science;* 4-8 Nov. 1990; Toronto. Medford, NJ: Learned Information Inc.; 1990: pp. 117-128.

SILVER, H., 1987. Supporting CD-ROM users and its effect on library services. *In: Optical publishing and storage: products that work. Proceedings of optical publishing and storage,* 11-13 Nov. 1987; New York. Medford, NJ: Learned Information Inc., 1987: pp. 151-154.

SLOAN, S., 1990. COMPENDEX PLUS* on CD-ROM: a review. *CD-ROM Professional;* 1990; 3(6): pp. 35-38.

STEFFEN, S.S., 1986. College faculty goes online: training faculty end users. *The Journal of Academic Librarianship;* 1986; 12(3): pp. 147-151.

STERN, B.T. and COMPIER, H.C.J., 1990. ADONIS - Document delivery in the CD-ROM Age. *Interlending and Document Supply;* 1990; 18(3): pp. 79-87.

SU, L., 1989. An investigation to find appropriate measures for evaluating interactive information retrieval. *In:* J. KATZER and G. B. NEWBY, eds. *ASIS '89. Proceedings of the 52nd ASIS annual meeting,* 30 Oct. - 2 Nov. 1989. Medway, NJ: Learned Information Inc.; 1989: pp. 13-23.

TENOPIR, C., 1985. Systems for end users: are there end users for the system? *Library Journal;* 1985; 110(11): pp. 40-41.

TUCK, W.R., 1992. Satellite transmission and document supply. *Interlending and Document Supply;* 1992; 20(4): pp. 138-142.

TUCK, B., 1993. Telecommunications infrastructure: problems and solutions. *Serials;* Nov. 1993; 6(3): pp. 51-57.

VAN SLYPE, G., PAGE, J. and VAN HALM, J., 1988. Evaluation of experiments in electronic document delivery and electronic publishing. *LIBER News Sheet;* 1988; (23): pp. 18-23.

VERNIMB, C., 1983. Requirements for document delivery in Europe. *Electronic Publishing Review;* 1983; 3(4): pp. 327-330.

WAAIJERS, L., 1992. Online Vs. CD-ROM delivery of information. *Interlending and Document Supply;* 1992; 20(2): pp. 61-66.

WALKER, C.J. ET AL., 1991. Problems encountered by clinical end users of MEDLINE and GRATEFUL MED. *Bulletin of the Medical Library Association*; Jan. 1991; 79(1): pp. 67-69.

WALKER, G., 1986. End-user searching: the beginning or the end? *Reference Librarian*; 1986; (14): pp. 39-51.

WALKER, G., 1988. The search performance of end-users. *In: National online meeting. Proceedings of the 9th national online meeting*, 10-12 May 1988; New York. Medway, NJ: Learned Information Inc., 1988: pp. 403-410.

WALLMANNSBERGER, J., 1991. The scholar's workplace in the global village: from online services to unlimited docuverses. *In:* D. I. RAITT, ed. *Online information 91. 15th international online information meeting proceedings*, 10-12 Dec. 1991; London. Oxford: Learned Information; 1991: pp. 239-251.

WEAVER, C.G., 1984. Electronic document delivery: directing interlibrary loan traffic through multiple electronic networks. *Bulletin of Medical Library Association*; Apr. 1984; 72(2): pp. 187-192.

WEISBERG, H.F., 1977. *An introduction to survey research and data analysis*. San Fransisco: W.H.Freeman & Co.

WHITEFIELD, H.F., 1991. A framework for human factors evaluation. *Behaviour and Information Technology*; 1991; 10(1): pp. 65-79.

WHITSED, N., 1989. CD-ROM: an end user training tool? - The experience of using Medline in a small medical school library. *Program*; Apr. 1989; 23(2): pp. 117-126.

WHITTALL, J., 1989. CD-ROM in a specialist environment. *In: SCIL'89 international. Proceedings of the third annual conference on small computers in libraries*, Feb. 1989; London. London: Mecker; 1989: pp. 119-121.

WIGGINS, R.E., 1990. Document image processing - new light on an old problem. *International Journal of Information Management*; 1990; (10): pp. 297-318.

WOOD, D.N., 1993. Recent developments at BLDSC. *Serials;* Mar. 1993; 6(1): pp. 21-26.

WOOD, J.L., 1983. Document delivery and new technologies. *Interlending and Document Supply*; 1983; 11(3): pp. 127-130.

WRUZBURGER, M., 1987. Conducting a mail survey: some of the things you probably didn't learn in any research methods course. *College and Research Library News*; Dec. 1987; 48(11): pp. 697-700.

YANNAKOUDAKIS, E.J. and RIDLEY, M.J., 1989. The DOCMATCH project. *Outlook on Research Libraries*; Sept.1989; 11(9): pp. 3-7.

YATES, D.M., 1983. Project Hermes. *Aslib Proceedings*; Apr. 1983; 35(4): pp. 177-182.

APPENDIX A

EI REFERENCE DESK INSTRUCTIONAL DOCUMENTATION

EI REFERENCE DESK
EASY MENU SEARCHING

Help is available by pressing F1

Getting started

Check that the equipment is switched on. If it is not ask a member of staff in the Information Office.

Select the relevant disc - Each year of E.I. is on a separate disc.

Press OPEN/CLOSE button on the CD-ROM disc drive E and insert selected disc with label face up. Press button again to close drive. DO NOT PUSH CLOSE. (FOR PAGE ONE USE DISC DRIVE D)

The 'Ei' logo will appear in the centre of the screen surrounded by five icons (options).

Using the mouse attachment move the arrow until it is pointing inside the ON DISC icon. Press the **left-hand button of the mouse twice in rapid succession** to activate the system.

"Welcome to Dialog on disc (tm) Manager"
now appears on the screen.

AT THIS POINT DISCONTINUE USING THE MOUSE The mouse has no effect on the On Disc screen functions.

Using the arrow↓↑ keys, highlight your search mode *'Easy Menu search'*

press enter key↵ to select (To return to the previous menu press ESC key)

Searching on Ei

Highlight the option *'Begin a New Search'* press enter key

Select your search option from the next screen - press enter to select

Word/Phrase Index   - Search Terms appear in an alphabetical format with number of references displayed. Select as many items as you wish from the list using arrow keys, then press enter key to select. Press F10 to display results.

EI Subject Headings   - Alphabetical index of subject headings
Author Name   - Alphabetical index by surname
Author Affiliation   - Alphabetical index of place names
Title Words   - Searches for words in the title field
Journal Name   - Alphabetical index of journal titles
Conference Search Options   - search by title, sponsor, year or location

Limit Options (English)   - search English only
                                  - Journal articles only
                                  - Conference papers only
                                  - Latest on disc Records only

Additional Search
Options   - words and phrases: this option allows you to keyword search. Enter your search term and press enter key to execute the search. The search results are then displayed with the select main activity menu. (see options below and Truncation Section)
                                  - Ei classification codes
                                  - major subject headings
                                  - treatment codes
                                  - year of publication
                                  - language

Example: If you enter *'Precast Concrete'* the system will look for references where this exact phrase appears in the text. By typing *'Precast, Concrete'* the system looks for references including Precast or Concrete.
To modify your search refer to appropriate section.

Used Saved Search   - Searches a previous search strategy

Display/view

Highlight |*Display Print or Transfer Selected Record(s)'*| press enter key

Highlight the appropriate format you require from the following options, then press enter key to select.

Complete Record   - Displays full record with abstract
Complete Record Tagged   - full record, fields tagged with two letter code e.g. TI = Title
Bibliographic Reference   - Bibliographic details, no abstracts.
Title List   - A list of references, titles only
User Defined Format   - select the fields you require

Records are then displayed
To change format press F4 to return to the format options.
F8 displays print options (refer to printing section below)

Printing

CHECK PRINTER IS SWITCHED ONLINE

Highlight ⌜*Display print or Transfer Selected Record(s)*⌝ press enter key

Highlight the appropriate format you require then press enter key to select (see options under display heading)

After selecting format press F8 to display print options.

Highlight an option and press enter key to start printing.

Note: The printer will not produce references until it has completed a full A4 sheet of paper. To retrieve short references Press 'Online' button (which takes the printer offline) and then press the form feed button.

Selecting references

To select certain references for printing press F7 Records. Then type the number of records you wish to select separated by a comma, e.g. 4, 8, 12-14, 16. Press enter key followed by F8 to select print. Press enter key again to start printing. THERE IS A LIMIT (I.E. ONE LINE OF INPUT) ON THE NUMBER OF REFERENCES THAT CAN BE PRINTED AT ANYONE TIME.

Modifying search

Highlight ⌜*Modify the current Search with additional criteria*⌝ press enter key

Highlight one of the following options and press enter key to select

Limit with additional concepts or terms (and)
Include alternate terms (or)
Exclude unwanted terms (not)
Delete Search steps   - (enter number of last search step to keep)

When you have completed your search press F10 to display results unless you are searching with additional search options where results automatically appear on the screen.

To display or print references refer to appropriate Section.

Saving a search strategy

After printing press ESC to return to the select main activity menu.

Highlight ⌜*Save Search Strategy for later use*⌝ press enter key to select

System then requires a file name - enter your surname or initials. Press enter key to save strategy (FILENAME CAN BE UP TO EIGHT CHARACTERS WITH NO SPACES)

Starting a search using a saved strategy

Highlight ⌜*Begin a New Search*⌝ press enter key

Highlight ⌜*Use Saved Search*⌝ press enter key

Select your strategy by highlighting your filename and press enter key

The Search Strategy will then run and display search results.

The Search Strategy will then run and display search results.

<u>Deleting a file</u>

Highlight 'Begin a New Search' press **enter** key

Highlight 'Use Saved Search' press **enter** key

Highlight your filename and press F2 to view. Then press **ctrl +D** to delete file.

Exit

Press F9 to restart. The next option displayed is *'clear previous options and start new search session (Y/N)?'*

Type Y to clear press **enter** key

Highlight 'Quit Easy Menu Mode' press **enter** key

<u>Changing discs</u>

Follow the **EXIT** instructions. Press OPEN/CLOSE button on the disc drive. Remove disc from drive. Insert a new disc. Press button again to close drive. DO NOT PUSH CLOSE. Highlight you search mode 'Easy Menu search' to resume searching on the next disc.

<u>To close Ondisc</u>

Use the mouse to click on ▭ in the upper left hand corner of the window.

Then select the close option followed by O.K. on the next screen.

Press OPEN/CLOSE button on disc drive. Remove disc from drive. Press button again to close drive. DO NOT PUSH CLOSE.

<u>Function Keys in Easy Menu Search</u>

enter ↵	- Select
↓↑	- Move
F1	- Help
F4	- Format of records e.g. bibliographic, full, etc.
F5	- Sort e.g. by title, author, year, etc.
F7	- To Select Records
F8	- Print
F9	- Restart (to begin a new search)
F10	- Display
ESC	- Previous Menu
PgDn	- Next Page
PgUp	- Previous page
Ctrl & PgDn	- Next Record
Ctrl & PgUp	- Previous Record

<u>Truncation</u>

Precast?	= any number of characters following the term
Precast? ?	= maximum of one additional character
Precast??	= Maximum equal to number of question marks (in this case 2)
Wom?n	= allows character replaced by the question mark to vary

Ei REFERENCE DESK

PAGE ONE SEARCHING

Getting started
Check that the equipment is switched on. If it is not, ask a member of staff in the Information Office.

Select the relevant 'Page one' disc.

Press OPEN/CLOSE button on the CD-ROM disc drive D and insert selected disc with label face up. Press button again to close drive. DO NOT PUSH CLOSE. (For Ei on disc, use disc drive E).

The 'Ei' logo will appear in the centre of the screen surrounded by five icons (options).

Using the mouse attachment, move the arrow until it is pointing inside the   icon.
                                                      Ei Page One

Press the **left-hand button of the mouse twice in rapid succession** to activate the system.

'Ei Page One Database
Table of Contents'
now appears on the screen.

Searching on Page One

Selecting Options

Using the mouse attachment, move the arrow until it is pointing inside one of the options on the menu bar.

FILE	EDIT	BROWSE	SEARCH	ASSISTS

Click the **left hand button of the mouse** to select the appropriate option.
(Refer to attached sheets).

Exiting Ei Page One
To close Page One click on the control bar - in the upper left-hand corner of the window, and then select the close option.

On the following screen *session [untitled session] has changed. Save current changes?*
                                  YES NO   CANCEL

Select No to return to the first 'Ei' screen.

Function Keys

Browse
ctrl + PgDn   - Next Contents
ctrl + PgUp   - Previous Contents
ctrl + T   - Toggle (moves between your last two selections)

Search
ctrl + K   - Next Keyword
ctrl + N   - Next Article
ctrl + P   - Previous Article

SEARCH

Select Search Option from the Menu bar

Select Expression ⟶ Enter an expression

(search term)

Execute
(Select to Search)

Cancel

Search results
are displayed

Returns to the first screen

O.K.

Cancel

Results

Returns to the first screen.
Saves search in the previous search window

Returns to the first screen

References Displayed

Go to contents

order

print

cancel

Displays the full contents page in which the highlighted reference appears

To order references

Prints all references

Returns to the first screen

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BROWSE

Select **Browse** option from the menu bar

Select **Journal/issues** $\longrightarrow$ Alphabetical list of titles (Highlight a title)
(from the menu)

O.K.   Cancel

(or Type in a Journal name)

Displays contents of highlighted title   Returns to first screen

BROWSE

Select **Browse** Option from the menu bar

Select Alphabetical   →   Table of Contents
Titles
(from the menu)   ↓

                                           Change Level (or double click on table of contents)

                                                                        ↓

                                                          List of Titles Displayed

                        Change Level   **Go to Contents**   **Cancel**
                              ↓   ↓   ↓
                        Displays issue   Displays contents pages of   Returns to first screen
                        numbers/parts for the   highlighted title
                        highlighted title

Change Level   **Go to contents**   **Cancel**
     ↓   ↓   ↓
Displays the contents of   Displays the contents   Returns to the first screen
the highlighted issue   pages (with page
number   numbers) for the
                             highlighted title

EI REFERENCE DESK
DIALOG SEARCHING

Follow the *'Easy Menu'* instructions for Getting started

until *"Welcome to Dialog on disc (tm) Manager"*

appears on the screen.

Using the ↑↓ arrow keys, highlight your search mode

│ *'DIALOG command search'* │ press enter key ◄——┘ to select.

Searching on Ei

Use the following commands to search your selected Compendex Plus or Chem disc:

S   =   search/select
creates a set of records that contain the specified term/s. Can be used with words, prefix or suffix codes, or set numbers.

S Emulsions	search for word
S Au = Smith, J.	search for author
S S1 and S2	search for set one and set two

SS   =   search/select steps
Identical to above, except that a set is created for each term.

SS Precast and Concrete	S1 Precast
	S2 Concrete
	S3 Precast and Concrete

Starting a search using a saved strategy

Type **EXS** followed by your file name. Press **enter** key; the search strategy will then run and display search results.

      EXS WellS2

DS   =   Display sets
Lists all of the sets formed.

      DS10 - Display set number 10
      DS10-15 - Displays set numbers 10-15

E   =   Expand
Displays the portion of the data-base index in which the specified term appears.

E AU=Price, S - Displays the author index under the surname of Price.

Limitall   =   Restricts all subsequent sets to the criteria specified. Enter LIMITALL CANCEL to cancel the restrictions.

LIMITALL/ENG -	Limits subsequent sets to English Language only
Precast/ENG -	Limits current set
/ENG =	English Language Documents
/MAJ =	Major descriptor
/YYYY =	Publication year 1987:1988

Sort   =   Sorts the specified set of records by the fields indicated.

SORT S1/ALL/AU - sort all of set one by Authors
surname

D   =   Display
Displays search results one screen at a time. If a format is not specified, FORMAT 2 is displayed. Enter D to view next record.

D S4/5 - Display set four in full record format.

Display set no/format/number of records

T   =   Type
Provides a continuous 'online' display of search results. If a format is not specified, FORMAT 2 is displayed. Enter T to view next record.

Format Options

1	-	Dialog Accession Number
2	-	Full record except abstract
3	-	Bibliographic Citation
5	-	Full record
6	-	Title
7	-	Bibliographic Citation and abstract
8	-	Title and Indexing

PR   =   Print
Prints search results.

PR S4/6 -   Print set four, titles only.
print set no./format/number of records

PR-   =   Cancels print request

Field Name - prefix codes

AU	=	Author	- S AU=Wells, D. B.
CO	=	Company name	- S CO=Jaguar?
CS	=	Corporate Source	- S CS=Loughborough Univ?
JN	=	Journal Name	- S JN=New Scientist
LA	=	Language	- S LA=German
PY	=	Publication year	- S PY=1989

DT   =   Document type

-S DT=CP Conference Proceeding
      JA Journal Article
      PA Proceedings Article
      DS Dissertation
      MC Monograph Chapter
      MR Monograph Review
      RC Report Chapter
      ST Standard
      TX Textbook
      Up Unpublished paper/preprint

Conferences

S CT=Conference Title
S CN=Conference Number
S CL=Conference Location
S CD=Conference Date - Format YYYYMMDD (only the starting date can be searched)
S SP=Conference Sponsors

Boolean Operators

OR	=	Retrieves all records that contain at least one of the search terms.
AND	=	Retrieves all records that contain all of the search terms.
NOT	=	Eliminates a search term/s.

Proximity Operators

(W)	=	Terms must be adjacent to each other and in the order specified. S Precast(W)Concrete
(nW)	=	Terms must be within 'n' words of each other and in the order specified S Construction(4W)productivity
(N)	=	Terms must be adjacent but in any order. S Solar(N)Energy
(nN)	=	Terms must be within 'n' words of each other and in any order S Motivation(3N)Productivity
(L)	=	Terms must appear in the same 'descriptor's' fields.
(F)	=	Same field any order.

Truncation - ?

Precast?	=	any number of characters following the term
Precast? ?	=	maximum of one additional character
Precast??	=	maximum equal to the number of question marks (in this case 2)
Wom?n	=	allows character replaced by the question mark to vary

Search order

proximity operators — not — and — or

Use parentheses to specify a different order. Terms within parentheses are executed first.

S (Building or Construction) and regulations

Saving a Search Strategy

Type **save** followed by your **file name** - enter your surname. Press *enter* key to save strategy. (Filename can be up to eight characters with NO SPACES)

Save Wells

To Exit dialog

Type **Logoff** which return you to the first menu screen.

Changing discs

Follow the **EXIT** instructions. Press **OPEN/CLOSE** button on the disc drive. Remove disc from drive. Insert a new disc. Press button again to close drive. **DO NOT PUSH CLOSE.** Highlight your Search mode *'Dialog command search'* to resume searching on the next disc.

APPENDIX B

QUESTIONNAIRES

Appendix B: Questionnaires

Note: This Appendix contains a copy of the test group members' questionnaire used during this research. The general library users questionnaire was identical apart from the omission of the document delivery section.

LOUGHBOROUGH UNIVERSITY OF TECHNOLOGY
PILKINGTON LIBRARY

Ei REFERENCE DESK QUESTIONNAIRE

Please tick the appropriate boxes

User Details

Staff

Reasearch Assistant

Postgraduate Research

Postgraduate Course

Undergraduate

Other

(please specify) ....

Department ....

How often do you use the following?

	Daily	Weekly	Monthly	Quarterly	Yearly	Never
CD-ROM Products in the Library						
Microsoft Windows Software						
Printed version of Engineering Index ..						
InterLibrary Loans Service						
Online Search Service						

How many online searches have you had over the last two years?

Have you ever had a 'Compendex*Plus' online search?

Yes ☐   Unsure ☐   No ☐

If yes, how many?

Using the Ei Reference Desk
Use of Compendex*Plus/ChemDisc

Which search mode did you use?

Easy menu	
Dialog	

Which year/s did you search?

ChemDisc   1984/5 ☐   1986/7 ☐   1988/9 ☐   1990/91 ☐

Compendex*Plus   1986 ☐   1987 ☐   1988 ☐
                    1989 ☐   1990 ☐   1991 ☐

Which Easy Menu Search options did you use?

Word/phrase index

Ei subject headings

Author name

Author affiliation

Title words

Journal name

Conference options

Limit options

Additional options   →

Words and phrases

Ei Classification codes

Major subject headings

Treatment codes

Year of publication

Language

Dialog Command Search
Which of the following commands did you use?

Search commands	Output commands	Prefix codes	
S	T	AU	JN
SS	D	CO	LA
E	PR	CS	PY
DS	Sort	DT	
Limitall			
EXS			

Proximity Operators   Format Options

W	nN	1	6
nW	L	2	7
N	S	3	8
		5	

Did you need additional help to use the system?

	Yes	No
Easy menu		
Dialog		

If yes, what source of help?

	Easy menu	Dialog
Library Staff		
Help Screens		
Library Handout		

Other

(please specify) . . . .

If you used a library handout did you find it?

Easy Dialog	Easy Dialog	Easy Dialog	Easy Dialog	Easy Dialog
Menu	Menu	Menu	Menu	Menu

very helpful   helpful   adequate   unhelpful   very unhelpful

If very unhelpful please comment. . . . .

. . . .

Did you use the Ei Training Manual?   Yes ☐   No ☐
If yes, was it?

Easy Dialog	Easy Dialog	Easy Dialog	Easy Dialog	Easy Dialog
Menu	Menu	Menu	Menu	Menu

very helpful   helpful   adequate   unhelpful   very unhelpful

If very unhelpful please comment. . . . .

. . . .

How easy did you find Ei Ondisc to use?

☐   ☐   ☐   ☐   ☐

very easy   easy   average   difficult   very difficult

Any other comments. . . . .

. . . .

Use of Page One

Which page one options did you use?

Browse ☐   Alphabetical titles ☐
              Journal/Issues

Search ☐   Expression ☐ → Assists ☐ → Word list ☐
            Direct   Operators list
            Results   Field list
            Options

Assists ☐   Edit annotation ☐
            Return to annotation
            Place bookmarks
            Show journal title

Did you need additional help to use the system?   Yes ☐   No ☐
If yes, what source of help?

Library staff ☐   Library handout ☐
Help Screens   Other
                         (please specify) . . . .

If you used a library handout did you find it?

☐   ☐   ☐   ☐   ☐
very helpful   helpful   adequate   unhelpful   very unhelpful

If very unhelpful please comment . . . .

. . . .

Did you use the Ei Training Manual?   Yes ☐   No ☐
If yes, was it?

☐   ☐   ☐   ☐   ☐
very helpful   helpful   adequate   unhelpful   very unhelpful

If very unhelpful please comment . . . .

. . . .

How easy did you find Page One to use?

☐   ☐   ☐   ☐   ☐
very easy   easy   average   difficult   very difficult

Any other comments . . . .

General Review

How long did you use each of the following?
(in minutes)

Compendex*Plus

Chemdisc

Page One

Ei Online

	Very Easy	Easy	Average	Difficult	Very Difficult
How easy did you find the mouse to use?					
How easy did you find the windows software to use? Ei ondisc					
Page One					
How easy were the menu screens to follow? Ei ondisc					
Page One					

Which of the following broad Ei subject categories does your search fall into?

Chemical Engineering

Civil Engineering

Mechanical Engineering

Electrical & Electronic Engineering

Mining, Metals & Petroleum Engineering

Other (please specify). . . . .

What was the topic of your search?

. . . .

What search terms did you use?

. . . .

. . . .

In total how many references did you retrieve?

What percentage of references at first glance appear to be?

very relevant   relevant   not relevant

How many references do you intend following up from the items retrieved?

Is this the first time you have looked for references on this subject?

Yes ☐　　　　No ☐

If No, which other sources have you used?

. . . .

. . . .

. . . .

How does Ei Reference desk compare with the other sources/services?

. . . .

. . . .

. . . .

. . . .

Do you intend to search other abstracting sources/services for information on this subject?

Yes ☐　　　　No ☐

If the references retrieved are useful to your work, in which of the following areas will they be used?

Teaching ☐　　　　General interest ☐

Research Project ☐　　　　Useful to colleagues ☐

Coursework ☐

Other (please specify) . . . .

Would you prefer to conduct searches on the Workstation

By yourself ☐

Through an intermediary Librarian ☐

Why? . . . .

. . . .

. . . .

Any other comments? . . . .

. . . .

. . . .

Document Delivery

How many of the selected references are available in this library's stock?

[   ]

How many references did you order via document delivery?

[   ]

How many requests did you receive via document delivery?

[   ]

What percentage of the requests received are?

☐   ☐   ☐
very relevant   relevant   not relevant

How often is the speed of access important to you, with regards to document delivery?

☐   ☐   ☐   ☐   ☐

always   frequently   sometimes   rarely   never

Why? ....

....

The standard Interlibrary Loan (ILL) charge is presently £4. Would you be prepared to pay £12 for this special rapid service?

Yes ☐   No ☐

Why? ....

....

Any other comments? ....

....

APPENDIX C

TEST GROUP MEMBERS: - COMMENTS

TEST GROUP MEMBERS

Ei Ondisc Comments

"Slow to print items"..

"Need time to become familiar with search language - first attempt".

"A header on the printed page would be nice to display the search strategies carried out".

"There is screen flash if you scroll down too fast on words/phrases".

"Compendex is quicker than Page One, more capable".

"Dialog is a quick search method, although I prefer the menu driven title list display available using the F4 key".

"Dialog - quick searching when you understand the command language".

"Dialog searching is faster to use when you are familiar with the command language".

"Search via easy menu option had insufficient space to conduct the search. We had to use the Dialog command language to retrieve any results".

Page One Comments

"Print feature - no option to select records".

"No abstracts - difficult to trace contents".

"Very useful - not very friendly".

"Preferred Page One type of searching, saving to order file, and the flexibility compared to Compendex structure".

"Windows o.k., slow, scrolling down very poor. Journal/issues is o.k., it allows you to enter a title".

"Interface is good, slow to respond to scrolling, truncation commands, search facilities and printing options are limited. Quick to use".

"Nice interface, no option to select items for printing".

"Difficult to decide on search word combinations".

"Easy to use although I do not like using mouse systems".

"Problems with truncation on Page One".

"I am used to using a mouse and prefer pull down menus".

"I would like to be able to select items for printing".

"It seems slow to page down. It would be nice to have search strategies automatically printed above the results".

TEST GROUP MEMBERS

QUESTION

How does Ei Reference Desk compare with the other sources/services you have used?

"Since the last Ei search I have tried the Bids system again, even trying some of the author names retrieved from Ei last time. I could find no references via Bids. Ei very useful".

"Easier to use than management Abs".

"A lot better than Bids includes abstracts. A Bids search retrieved no references. Compendex retrieved very relevant material".

"Better than scanning journals".

"Quick, relatively painless".

"Quicker to use".

"Easier than printed Science Citation Index".

"Very handy for searches and exploring new strategies which you get frustrated by the conventional book type of look up techniques".

"Good, quick to use".

"Disc's may be only touching this subject area 'Safety'".

"Very good".

"Easy to use. A combination of OPAC with abstracts".

"Easy to use - relevant material retrieved".

"Easy to use. Contains very relevant information - a good source".

"Very good - no material on Bids. Spot on material and general background retrieved using Compendex, very impressive".

"Useful - could be better than it is".

"Faster, easier, I prefer this source to printed".

"Useful to have the abstracts. I found both Asti and Compendex useful".

"Good, I expect to try the library's management CD for the classification search, little information on Compendex".

"A good source".

"Better - very relevant material".

"Good. Difficult to find any references using Bids".

QUESTION

Would you prefer to conduct searches on the workstation by yourself or through an intermediary?

By yourself - comments

"Easy to tailor search - depending on what you find"."

"To refine search strategies - browse".

"I can be more selective, and can modify words during the session".

"Know my way around computers".

"Browse - may find other useful material".

"Able to modify Search and Keywords".

"Useful to browse Search terms/subject headings".

"Easy to use".

"Depending on the needs of a particular Search".

"Closer to the subject area, I can refine the Search".

"Once you are familiar with the system the need for assistance is reduced. Useful to have staff available should problems arise".

"After using the machine last time to develop a strategy with the librarians help I feel confident to run strategies and use the system by myself. I can browse the material to refine my search strategies".

"Take your time, try different things".

"Starting with a librarian - help to set up. When familiar with the system, I am happy to use it by myself".

"If help is available when required".

"Help required with Search techniques, but it is useful to browse by myself".

"Prefer to set up Search Strategies with a librarian, then use the equipment myself to browse".

"Although I can use the system it is nice to have advice on hand when required, especially with Search Strategies".

"Easy to tailor search - depending on what you find".

"I like to refine Searches after browsing some of the results".

"Providing help is available. I prefer to browse through material and refine the search accordingly".

"Easy to think about what I want - no problem with time, more fun".

"I can see things I am interested in and not looking for. Need time to find the right keywords".

"Not under pressure, no time constraint. Allows you to browse".

"Can try different terms, not under any pressure".

"Try different terms - no pressure".

"Easy to use, I can browse and change the Search pattern".

"Easy to use, I can play around with the Search criteria".

"Able to refine Search Strategies and browse".

"I know the subject area, and can refine my Search".

"The intermediary knows how the system operates. But the interface is easy to follow to Search by yourself".

Through an intermediary/librarian - comments

"Require help on search strategies. Although I can work the system myself".

"Help required to formulate search strategies. Prefer to work with a librarian although the hardware and software are easy to use".

"Prefer to work with an intermediary although equipment is easy to use after training. Help with search strategies and the command language".

"Useful to set up search strategies with a librarian then use the equipment myself to browse".

"Starting with a librarian - help to set up. When familiar with the system, I am happy to use it by myself".

"Help required with Search techniques, but it is useful to browse by myself".

"Prefer to set up Search Strategies with a librarian, then use the equipment myself to browse".

"Although I can use the system it is nice to have advice on hand when required, especially with Search Strategies".

"Initially to help with commands and general Search Strategies, and the options or short cuts available".

"No need to learn how to use the system".

"Help with the equipment and initial Search set up. Useful to have advice".

"Useful advice".

"The intermediary knows how the system operates. But the interface is easy to follow to Search by yourself".

"Help required with Search Strategies, command language. Prefer to work with an intermediary. The equipment is easy to use after training".

"Help with Commands and setting up Search Strategies".

"Help in building Search Strategies required".

"Need supervision to start".

"System help is useful although I like to be able to refine and browse myself".

"Depending on the needs of a particular Search".

"Help with Commands and ordering of documents".

"To get started - motivation".

"Introduction to develop the strategy. Need support in the early stages".

"Useful to have someone who knows the machine to bounce ideas regarding the Search".

"Intermediary knows the system (expert). Prefer to work alongside the intermediary. Not enough time to learn the whole system".

"To save time. To be sure I am using the System correctly".

QUESTION: How often is the speed of access important to you, with regards to document delivery and why?

Comments grouped by importance

Always

"So that I may get started on my research/report to meet the deadline".

Frequently

"Only when the paper looked to be particularly relevant".

"Because when I'm working on a proposal it's better to have all the information to hand".

"Interlibrary loans are often required to provide the information necessary to complete current work".

"Because interlibrary loans can take a long time and it's easier to take all the information together to make a report/case etc. (while you're working on it and not something else ... short term planning is easier than long term)".

"Nice to get the papers before moving on to another topic".

"Generally as it happens I have to switch topics almost on a two week basis and as I start another topic to concentrate it would be nice if the references had been received for the previous search".

"Very relevant documents often influence the design of our control system software".

"Lack of information will often delay progress of research".

"Because of research deadlines".

"Because of the speed at which Information Technology develops and the need to support the investigation of new ideas in systems currently under development".

Sometimes

"Only important when I need item for a specific deadline - usually normal delivery time is fine".

"Mostly there is no great urgency as I am reading for general interest in an area, however, when research to support a grant proposal speed is important".

"Deadline of the completion of associated reports".

"Useful to be able to get material for a current work problem".

"Useful to be able to get material relevant to current work problem as soon as possible".

"There are plenty of other tasks to work on whilst awaiting delivery".

"Short deadlines to fulfil".

"For very important papers".

"Speed of access may be important for urgent constancy enquiries".

"The information requested may be needed to enable research activity to progress".

"For projects".

"Special project work".

"MSc project has to be finished in quite a short time".

Rarely

"Most papers requested are to provide background knowledge".

"The reading of papers is important but with the length of a PhD no real urgency needed".

"In research speed is not a priority".

"My work is long term research".

"Correct project planning should be robust enough to cope with relatively short delays".

"The information has rarely any effect on work in hand, but is used for future planning".

"Because I have a backlog of things to read".

"I am involved in a 3 year research project, usually the delivery speed of ILL will do".

Never

No comments.

QUESTION: The standard interlibrary loan (ILL) charge is presently £4. Would you be prepared to pay £12 for this special rapid service?

Comments from people with a YES answer

"Yes - but only when it was anticipated that the document concerned would be of the 'very relevant' type".

"Yes - but only when the paper looked to be particularly relevant".

"On the occasions when nearing the completion of a grant proposal or preparation of a paper, a swift response is all that is useful".

"Only when it was anticipated that the document concerned would be of the 'very relevant' type".

"Yes but only when the paper looked to be particularly relevant".

"It would depend on particular circumstances".

"In most cases £4 is adequate but for 4 of the requested references it was useful to have them straight away for, in this case, a meeting".

"Only as the project or investigation demands. Very selective".

"If the material is required in order to meet a deadline".

"If material is required in order to meet report deadlines, then the rapid service is useful".

"Only if guaranteed a 24 hour delivery service".

"As I understand the special rapid service is the part of the Ei Reference Desk which is helpful and powerful. I think this facility is very useful".

"For some urgent needs".

"Exceptionally, if an urgent consultancy enquiry was involved".

"If one could be sure that the document contained the desired information (sometimes abstracts are variable in their usefulness)".

"On occasions when a deadline is looming".

Comments from people with a NO answer

"I can usually 'plan ahead' and so waiting for documents (say 1-2 weeks) is not a problem".

"I think the high speed service would be used as the norm and would become the normal very busy and slow service".

"It would prove prohibitive because of the high volume of papers I need".

"I usually plan my time".

"Well, I would be suspicious, what implications would this hold for the standard service? Would it lead to the diversion of effort to the new service and thus herald the deterioration of the current one? Indeed, would there be any real option? If this were a new service independent of the current one, then yes it would be nice to have it available. I think that the NO box would receive my vote until such fears could be laid to rest".

"I can usually 'plan ahead' and so waiting for documents (say 1 - 2 weeks) is not a problem".

"Speed is not of the uppermost".

"I'd be prepared to pay for certain references to arrive quickly since late arrival would be past their immediate relevance point".

"If per document NO; if overall YES. My budget can only stretch so far".

"A rapid service would rarely be required and it would be difficult to justify three times the price".

"Too expensive especially if more than 2-3 documents are required - could restrict the amount of information gathered".

"Only if 24 hours service".

"It would be worth having if it was a turn around 24 hours".

"Rapid? I don't mind if it is slower at £4".

"There is no real urgency involved with regard to the papers".

"Correct project planning is required".

"I would prefer to order a whole conference if the price was £12 to scan and copy a relevant paper".

"£12 is a lot of money".

"The current interloan turn around is quite good. I might in special circumstances".

TEST GROUP MEMBERS

QUESTION: Ei Reference Desk. General comments

"The system is slow compared to Engineering workstations. More memory may have to be added to the system. Useful to be able to truncate terms".

"Menu Software - not very well interlinked, sometimes a long process".

"When selecting references the print feature did not reflect the same total number of references for printing. Otherwise quick and relevant material found".

"Workstation PC-based, slow using page one. It is slow to move down a page. A Sun Workstation is much faster".

"Sometimes the system response seems slow".

"Need help to take care of the system crashes which happen often".

"The print feature would not display the correct number of items selected on two occasions".

"PR-Printed material to disc not printer".

"When selecting using words/phrases you can only select 75 headings (entries) before displaying the references".

"Error on drive E twice during search session".

"I expect to use the system again. Printing seems slow, I would like to see options to select items for printing from the title list screens".

"It would be useful if page numbers could be printed out on the Search result sheets".

"Slow to print items for Compendex Plus".

"It would be nice not to have to change discs."

"Good system, much better than Bids and easy to use after initial session. Shame that it only goes back so far. But you've got to start somewhere!"

"The normal ILL was adequate for most of the references 85% requested, though it was good to receive them quickly."

"Speed is not the only important factor. The quality of the user interface is paramount and the Ei reference desk is not bad. I also feel it is wise policy to ensure operation by experienced staff when required, with the option of self-use in an emergency."

"The Ei Index and Page One systems on CD-ROM proved to be easy to use and rapidly provided a large quantity of very relevant material. I found it far more productive than any of the paper-based abstract system which I have used previously."

"The Engineering Index is a very useful tool."

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"The service is very useful."

"The Ei Reference Desk yielded a large quantity of very relevant references which have all been published in the last 3 years. The document delivery service is very convenient. Finding and photocopying documents in the library is time-consuming. The Library photocopy service would be much more useful if it included finding the material."

"Since I filled in the initial questionnaire I have used the system quite a bit. I tend to use the DOS base (Compendex Plus?) system most."

The things that I liked were:

"Abstract, Abstract!, Abstract!! - Gives you an extra degree of freedom over citations and allows you to find work and ideas that are useful to you though they may have been done in a completely different area of interest or even discipline to your own."

"The ability to print the result of searches - especially in customised format (and especially free!)."

Things that I didn't like:

"Some of the functions were not very well integrated and required manual re-entry of information. The inability to select a number of items from an initial list of retrieved document references gets my goofup award."

"Feels very 'prototype', don't like the distinction between the easy search the hard(?) one before you even start, I like things to be there if and when I need them in one consistent interface. They can be hidden if I wish - tools collected on a toll-bar providing options for a particular situation are a good end-tested way of doing this (especially for windows)".

Services I would like:

"The ability to get to the indexes (CD or on-line) from my own computer would be nice."

"The ability to request documents directly over the ethernet or from mail - even if you designed an e-mail form they could be processed automatically would be great."

"Network Fax cards are becoming quite reasonable and give much better quality than fax machines. This could be a better approach to express document delivery by photocopy and snail mail (i.e. direct empale request (via library machines of course!) - >scanner->Fax or Janet (jpeg) image delivery) at low load times."

"Saves a lot of the tedious work in document Searches."

"I found the system very, very useful."

"I usually plan my time."

APPENDIX D

GENERAL LIBRARY USERS: COMMENTS

GENERAL USERS

QUESTION

How easy did you find Ei Ondisc to use?   Any comment?

Comments

"Easy -   *Hard to access right files, if device could look for files with similar keywords, i.e. mechanical - force - moments".*

"Average -   *Personally don't like MS Windows".*

"Easy -   *Set up by member of staff".*

"Easy -   *Slow to choose items".*

"Easy -   *Very quick to grasp".*

QUESTION

How easy did you find Page One to use?   Any comment?

Comments

"Difficult -   *It is awkward to use rather than difficult".*

"Average -   *Need option to select our titles, ploughing through 60 plus articles is*

    slow".

QUESTION

Did you use the Ei Training Manual?   If very unhelpful please comment.

Comments

"System jammed on a screen and no information given to assist retrace back".

GENERAL USERS

QUESTION

How does Ei Reference Desk compare with other sources/services?

"More relevant information on Ei. Easier to select out the relevant material".

"More information on Ei".

"Time consuming to change discs".

"Much quicker and easier, probably more thorough as well".

"Very quick and efficient. Useful for printouts".

"Prefer not to have to change discs".

"Very fast - easy to use. You can look at related topics quickly. Does not hurt the eyes so much!".

"Quick, easy, up-to-date. Allows a wider range of search. Provides better coverage than previous search methods tried".

"Good - more references".

"Better than CITIS - more references found".

"Very good and easy to use. Good facility to obtain print outs of information".

"OK but no relevant information for this topic (handwriting recognition)".

"I found as little as I did on the others".

"Offers an up-to-date wider range".

"First Class".

"Very well - I wish I had known about it earlier".

"Easier to use than DIALOG commands. Lot quicker than BIDS and more extensive".

"Faster, efficient. Once one becomes aware of the control functions it becomes easy to use".

"More up-to-date and user friendly, because I am very familiar with 'Windows'".

"Easy to use. Very useful as it gives a description of the articles".

"Very good".

"Excellent".

"Good, accessible, informative, printer handy".

"Much more convenient".

QUESTION

Would you prefer to conduct searches on the workstation by yourself or through an intermediary?

By yourself - comments

"Easy to use".

"Hard to explain what I'm looking for".

"An item of such specific matter can be scanned quicker if you know what you are looking for".

"Easier to follow".

"I know what I'm looking for".

"To gain experience and make sure I have covered the discs available".

"After assistance in getting going, it is easier to think/change strategy".

"I work better that way".

"I have a better understanding of the required subject (probably!) - hence I can see if a reference is going to be useful".

"More time to browse through related subjects that may yield additional references".

"Ease of use".

"I can work at my own pace and I would not be reliant on anybody".

"Need time to thing - topics on the edge may become of interest, you can change your focus".

"Once the system is learnt it is easier to browse through subject by yourself rather than through an intermediary".

"This enables you to modify and expand/contract the search in any area. Additionally, a very large number of keywords exist. A keyword search may give 100 references - 10 may be relevant, hence specialist knowledge necessary to discriminate".

"Easier to refine search when some results are displayed".

"I can take my time and concentrate".

"More control over search and I understand the technical terms and their variations".

"I know what I'm looking for".

"I feel confident enough to use the system myself and personal use is a better use of resources and is quicker".

"Quicker".

"I know what I need".

"Wouldn't want to bore the librarian".

"Freedom to explore alternative subjects and options".

"Because it gives me scope for modification and flexibility".

"Allows for backtracking through searches without using up valuable librarian's time".

"Quicker, plus, at this stage, I don't want to waste other people's time on generic searches".

"More control, time, own pace etc.".

"It is not very difficult to use".

"Both are useful at different times - (i) 'By yourself' for more speculative stuff (ii) 'through an intermediary' - for regular updates on established research areas".

"It is quicker, easier, and if you change your mind on what you want you can do".

"Need time to search through terms".

"Easier to learn the system once the basics have been learnt".

"Because of the search strategies, chance to browse other interesting items".

"Don't feel rushed or stupid when you press the wrong button".

"Easier to change the scope of the sarch".

Through an intermediary/librarian - comments

"Save time".

"Stand more chance of gaining the right information quickly and without getting frustrated".

"Both are useful at different times - (i) 'By yourself' for more speculative stuff (ii) 'through an intermediary' - for regular updates on established research areas".

"Librarian knows what she's doing".

"I am not well capable of doing it by myself at the start but now I am OK and I can run Ei by myself".

"No preference".

QUESTION

Ei Reference Desk. General Comments

"The system is very useful and easy to use".

"Much more pleasant to use then scouring through shelves of abstracts".

"Prefer not to have to change discs".

"The system has some bugs. It went wrong four times in the session, I had to reboot the system".

"Printing a single record does not work correctly".

"Useful to be able to save search strategy for other discs".

"Despite the ease of the system, it still takes quite some time to search".

"Complex questionnaire".

"Printing option in Page One is very non-selective".

"This is an excellent addition to the library service - highly recommended".

"From my recent observation I came to know that there are lots of information, but most of us do not know how to use all the systems".

"Very impressed, very useful and I hope to be able to use it in the future".

"Good system to use. Would be better if it identified more keywords to narrow the number of references".

APPENDIX E

SPSS-X VARIABLE AND VALUE LABELS

```
title 'Ei Reference Desk'
data list file=engqu records=6
 /1 caseno 1-7 user 8-13 dept 14-15 V1 16-21 V2 22-27 V3 28-33 V4 34-39
    V5 40-45 V6 46-48 V7 49-51 V8 52-54
 /2 V9 8-9 V10 10-13 V11 14-19 EMS1 20 EMS2 21 EMS3 22 EMS4 23 EMS5 24
    EMS6 25 EMS7 26 EMS8 27 EMS9 28 EMS10 29 EMS11 30 EMS12 31 EMS13 32
    EMS14 33 EMS15 34 EMS16 35 DCS1 36 DCS2 37 DCS3 38 DCS4 39 DCS5 40
    DCS6 41 DCS7 42 DCS8 43 DCS9 44 DCS10 45 DCS11 46 DCS12 47 DCS13 48
    DCS14 49 DCS15 50 DCS16 51 DCS17 52 DCS18 53 DCS19 54 DCS20 55
    DCS21 56 DCS22 57 DCS23 58 DCS24 59 DCS25 60 DCS26 61 DCS27 62
    DCS28 63 DCS29 64 DCS30 65
 /3 V12 8-9 V13 10-11 V14 12-13 V15 14-15 V16 16-17 V17 18 V18 19-28
    V19 29 V20 30-31 V21 32-41 V22 42 V23 43-47
 /4 PO1 8 PO2 9 PO3 10 PO4 11 PO5 12 PO6 13 PO7 14 PO8 15 PO9 16 PO10 17
    PO11 18 PO12 19 PO13 20 PO14 21 PO15 22 PO16 23 PO17 24 PO18 25
    PO19 26 V24 27-28 V25 29 V26 30 V27 31 V28 32 V29 33-37 V30 38
    V31 39-40 V32 41-45 V33 46 V34 47-51
 /5 V35 8-10 V36 11-13 V37 14-16 V38 17-19 V39 20-24 V40 25-29 V41 30-34
    V42 35-39 V43 40-44 V44 45 V45 46 V46 47 V47 48 V48 49 V49 50
    V50 51-53 V51 54-56 V52 57-59 V53 60-62 V54 63-65
 /6 V55 8-9 V56 10-11 V57 12 V58 13 V59 14 V60 15 V61 16 V62 17 V63 18
    V64 19 V65 20 V66 21-23 V67 24-26 V68 27-29 V69 30-32 V70 33-35
    V71 36-38 V72 39-43 V73 44 V74 45-46 V75 47
variable labels caseno 'case number'
                user 'user details'
                dept 'Department'
                V1 'Use of CD-ROM PRODUCTS'
                V2 'Use of Microsoft Windows Software'
                V3 'Use of Printed Engineering Index'
                V4 'Use of Interlibrary loan Service'
                V5 'Use of Online Service'
                V6 'Number of Online Searches'
                V7 'Use of Online Compendex Plus'
                V8 'Number of Online Compendex Searches'
                V9 'Compendex-Chemdisc Search mode'
                V10 'Chemdisc Search Years'
                V11 'Compendex Plus Search Years'
                V12 'Additional help via easy menu'
                V13 'Additional help via dialog'
                V14 'Source of help - Staff'
                V15 'Source of help - Help Screens'
                V16 'Source of help - Handout'
                V17 'Source of help - other'
                V18 'Helpfulness of handout'
                V19 'Comment'
                V20 'Use of Ei training manual'
                V21 'Helpfulness of training manual'
                V22 'Comment'
                V23 'Ei ondisc ease of use'
                V24 'Additional help via Page One'
                V25 'Source of help - Staff'
                V26 'Source of help - Help Screens'
                V27 'Source of help - Handout'
                V28 'Source of help - other'
                V29 'Helpfulness of handout'
                V30 'Comment'
                V31 'Use of Ei training manual'
                V32 'Helpfulness of training manual'
                V33 'Comment'
                V34 'Page One ease of use'
                V35 'Time of Compendex Session'
                V36 'Time of chemdisc session'
                V37 'Time of Page one session'
                V38 'Time of Ei online session'
                V39 'Mouse ease of use'
                V40 'Windows ease of use - Ei ondisc'
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V41 'Windows ease of use - Page one'
V42 'Menu screens ease of use - ondisc'
V43 'Menu screens ease of use - Page one'
V44 'Ei Subject categories - ChemEng'
V45 'Ei Subject categories - Civil Eng'
V46 'Ei Subject categories - Mech Eng'
V47 'Ei Subject categories - Elec Eng'
V48 'Ei Subject cat. Mining,metal,Petro'
V49 'Ei Subject categories - others'
V50 'Total number of refs retrieved'
V51 'Percentage of refs - Very relevant'
V52 'Percentage of refs - relevant'
V53 'Percentage of refs - not relevant'
V54 'Number of refs to be reviewed'
V55 'Subject Search before'
V56 'Search other sources'
V57 'References used for teaching'
V58 'References used for research'
V59 'References used for coursework'
V60 'References for general interest'
V61 'References useful to colleagues'
V62 'References used in other areas'
V63 'Search preference - By Yourself'
V64 'Search Preference - Intermediary'
V65 'Search Preference - Comment'
V66 'References available in stock'
V67 'Refs ordered via doc. delivery'
V68 'Requests received via doc. del.'
V69 'Percentage of requests - V. Relevant'
V70 'Percentage of requests - relevant'
V71 'Percentage of requests - N.relevant'
V72 'Importance of doc. del. speed'
V73 'Doc. Del. Speed - comment'
 V74 'ILL Special rapid service charge'
V75 'ILL rapid service - comment'

EMS1 'Easy menu - word phrase index'
EMS2 'easy menu - Ei subject headings'
EMS3 'easy menu - Author name'
EMS4 'easy menu - Author affiltation'
EMS5 'easy menu - Title words'
EMS6 'easy menu - Journal name'
EMS7 'easy menu - Conference options'
EMS8 'easy menu - limit options'
EMS9 'easy menu - Additional options'
EMS10 'easy menu - saved search'
EMS11 'easy menu - Add. Words/phrases'
EMS12 'easy menu - Ei classification'
EMS13 'easy menu - Major sub. headings'
EMS14 'easy menu - Treatment codes'
EMS15 'easy menu - Year of publication'
EMS16 'easy menu - Language'
DCS1 'Dialog - search command S'
DCS2 'Dialog - search command SS'
DCS3 'Dialog - search command E'
DCS4 'Dialog - search command DS'
DCS5 'Dialog - search command Limitall'
DCS6 'Dialog - search command EXS'
DCS7 'Dialog - output command T'
DCS8 'Dialog - output command D'
DCS9 'Dialog - output command PR'
DCS10 'Dialog - output command sort'
DCS11 'Dialog - Prefix code Au'
 DCS12 'Dialog - Prefix code CO'
DCS13 'Dialog - Prefix code CS'

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DCS14 'Dialog - Prefix code DT'
DCS15 'Dialog - Prefix code JN'
DCS16 'Dialog - Prefix code LA'
DCS17 'Dialog - Prefix code PY'
DCS18 'Dialog - Proximity Operator W'
DCS19 'Dialog - Proximity operator NW'
DCS20 'Dialog - Proximity operator N'
DCS21 'Dialog - Proximity operator NN'
DCS22 'Dialog - Proximity operator L'
DCS23 'Dialog - Proximity operator S'
DCS24 'Dialog - Format option 1'
DCS25 'Dialog - Format option 2'
DCS26 'Dialog - Format option 3'
DCS27 'Dialog - format option 5'
DCS28 'Dialog - format option 6'
DCS29 'Dialog format option 7'
DCS30 'Dialog format option 8'
 PO1 'Page one - Browse'
 PO2 'Page one - Alphabetical titles'
 PO3 'Page one - Journal issues'
 PO4 'Page one - search'
 PO5 'Page one - expression'
 PO6 'Page one - Direct'
 PO7 'Page one - Results'
 PO8 'Page one - options'
 PO9 'Page one - search Assists'
 PO10 'Page one - word list'
 PO11 'Page one - operators list'
 PO12 'Page one - field list'
 PO13 'Page one - Previous search'
 PO14 'Page one - Assists'
 PO15 'Page one - Edit Annotation'
 PO16 'Page one - Return to Annotation'
 PO17 'Page one - Place Bookmark'
 PO18 'Page one - Return to Bookmark'
 PO19 'Page one - Show Journaltitle'
value labels
         dept  1 'Mechanical Engineering'
               2 'Electrical Engineering'
               3 'Chemical Engineering'
               4 'Manufacturing Engineering'
               5 'Civil Engineering'
               6 'Transport Technology'
               7 'Engineering Design Institute'
               8 'Centre for Extension Studies'
               9 'Chemistry'
              10 'Design and Technology'
              11 'Business School'
              12 'Human Sciences'
              13 'HUSAT'
              14 'Library and Information Studies'
              15 'Physics'
              16 'Polymer Tech. and Materials Engineering'
              17 'External'
              18 'Computer Studies'
              19 'Geography'
              20 'Pilkington library'
              21 'Mathematics' /
         V49   6 'Manufacturing Engineering'
               7 'Chemistry'
               8 'Optical Engineering'
               9 'Materials Engineering'
              10 'Engineering design'
              11 'Computing'
              12 'Transport Technology' /
         user  100000 'Staff'
```

```
                10000 'Research Assistant'
                1000 'Postgraduate Research'
                100 'Postgraduate course'
                10 'Undergraduate'
                1 'Other'       /

V1 to V5   100000 'Daily'
             10000 'Weekly'
              1000 'Monthly'
               100 'Quarterly'
                10 'Yearly'
                 1 'Never'   /

   V6 V8  1'0 searches' 2 'from 1-4' 3 'from 5-8'4 'More than 9'/
   V7      100 'Yes'
          10 'Unsure'
           1 'No'     /
      V9     10 'Easy Menu' 11 'both' 00 'none'
           1 'Dialog'/
V12 to V13    10 'Yes'
              1 'No'    /
V14 to V16    10 'easy menu' 11 'both' 00 'none'
              1 'Dialog' /
 V18 , V21   1000000000 'Easy menu-very helpful'
             100000000 'Dialog-very helpful'
             10000000 'Easy menu-helpful'
             1000000 'Dialog-helpful'
             100000 'Easy menu-adequate'
             10000 'Dialog-adequate'
             1000 'Easy menu-unhelpful'
             100 'Dialog-unhelpful'
             10 'Easy menu-very unhelpful'
             1 'Dialog-Very unhelpful'   /
   V31 , V20 , V24 10 'Yes'
           1 'No' /
    V23 , V34, V39 to V43   10000 'Very easy'
         1000 'easy'
         100 'Average'
         10 'Difficult'
         1 'Very difficult' /
      V25 to V28 0 'not used' 1 'used'/
      V32 , V29   10000 'Very helpful'
       1000  'helpful'
        100 'adequate'
        10 'unhelpful'
        1 'Very unhelpful' /
      V35 to V38 1 '0 minutes'  2 '1-30 mins'
           3 '31-60 mins'
            4 '61-90 mins'
          5  '91-120 mins'
          6  '121-150 mins'
          7  '151-180 mins'
          8  '181-210 mins'
          9  '211-240 mins'
          10  '241-270 mins'
           11 'over 271 mins'  /
      V19,V22,V17,V28,V30,V33,V62,V65,V73,V75   0 'not used'
             1 'used'
      V39 to V43   10000 'Very easy'
         1000 'Easy'
         100 'Average'
         10 'Difficult'
         1 'Very difficult' /
       V44 to V48  0 'no' 1 'yes'/
      V50 1'0 refs' 2'1-50' 3 '51-100' 4 '101-150' 5 '151-200'
            6 '201-250' 7 '251-300' 8 '301-350' 9 '351-400'
```

```
                        10 '401-500' 11 'more than 500'/
                V54 1'0 refs' 2'1-50' 3 '51-100'4 '101-150'5 '151-200'
                        6 'more than 201' /
                V57 to V62 0 'not used' 1 'used'/
                V55 to V56   10 'Yes'
                  1 'No'   /
                 V63 to V64 0 'no' 1 'yes' /
                 V66 to V68 1'0 refs' 2'1-10' 3'11-20'4'More than 21'/
                 V51 to V53, V69 to V71  1 '0 to 25%' 2 '26 to 50%'
                             3 '51 to 75' 4 '76 to 100' /
                V72   10000 'Always'
                     1000 'frequently'
                     100 'Sometimes'
                      10 'rarely'
                       1 'never'   /
                 V74    10 'Yes'
                  1 'No'  /
                 V10    1000 '1984/5'
                 100 '1986/7'
                 10 '1988/9'
                 1 '1990/91'
                 0 'not used'
                 1100 '1984-1987'
                 1110 '1984-1989'
                 1111 '1984-1991'
                 110 ' 1986-1989'
                 111 ' 1986-1991'
                 11 '1988-1991'/
                 V11     100000 '1986'
                  10000 '1987'
                  1000 '1988'
                  100 '1989'
                  10 '1990'
                  1 '1991'
                  110000 ' 1986-1987'
                  111000   '1986-1988'
                  111100   '1986-1989'
                  111110   '1986-1990'
                  111111   '1986-1991'
                  11 '1990-1991'
                  111 '1989-1991'
                  1111 '1988-1991'
                  11111 '1987-1991'
                     0 'not used'
                  11000 '1987-1988'
                  1100 '1988-1989'/
                     EMS1 to DCS30  0'Not used' 1'Used'/
                     PO1 to PO19 0'Not used' 1'Used'/


recode      V6 V8 (0 thru 0=1)(1 thru 4=2) (5 thru 8=3) (9 thru hi=4)
recode     V56 to V68 (0 thru 0=1)(1 thru 10=2) (11 thru 20=3) (21 thru hi=4)
recode     V69 to V71 ( lo thru 25=1) (26 thru 50=2 ) (51 thru 75=3)
                (76 thru 100=4)

recode     V50 (0 thru 0=1)(1 thru 50=2)(51 thru 100=3)(101 thru 150=4)
                (151 thru 200=5)(201 thru 250=6)(251 thru 300=7)
                (301 thru 350=8)(351 thru 400=9) (401 thru 500=10)
                (500 thru hi=11)
recode     V54 (0 thru 0=1) (1 thru 50=2) (51 thru 100=3)
                (101 thru 150=4) (151 thru 200=5) (201 thru hi=60)

recode     V51 to V53, V69 to V71 (lo thru 25=1) (26 thru 50=2)
                (51 thru 75=3) (76 thru 100=4)
recode     V35 to V38 (0 thru 0=1) (1 thru 30=2) (31 thru 60=3)
                (61 thru 90=4) (91 thru 120=5) (121 thru 150=6)
```

```
              V23 to V25 0 'not used' 1 'used' /
              V33 to V35 1 '0 minutes' 2 '1-30 mins'
                         3 '31-60 mins' 4 '61-90 mins'
                         5 '91-120 mins' 6 '121-150 mins'
                         7 '151-180 mins' 8 '181-210 mins'
                         9 '211-240 mins' 10 '241-270 mins'
                         11 'over 271 mins' /
              V41 to V45, V60 to V61 0 'no' 1 'yes' /
          V46    6 'Manufacturing Eng'
                 7 'Chemistry'
                 8 'Optical eng'
                 9 'Materials Eng'
                 10 'Eng design'
                 11 'Computing'
                 12 'Trans Tech'      /
              V47 1 '0 refs' 2 '1-50' 3 '51-100' 4 '101-150' 5 '151-200'
                 6  '201-250' 7 '251-300'  8 '301-350' 9 '351-400'
                10  '401-500' 11 'more than 500' /
              V48 to V50 1 '0 to 25%' 2 '26 to 50%' 3 '51 to 75%'
                         4 '76 to 100%'   /
              V51 1 '0 refs' 2 '1- 50' 3 '51-100' 4 '101-150' 5 '151-200'
                 6  'more than 201' /
               V52 to V53   1 'Yes'
                  2 'No'  /
              EMS1 to EMS16, PO1 to PO19 0 'not used' 1 'used'    /
               V59,V15,V17,V20,V26,V28,V31,V62 0'Not Used' 1'Used'/
recode V6 V8 (0 thru 0=1) (1 thru 4=2) (5 thru 8=3) (9 thru hi=4)
recode V33 to V35 (0 thru 0=1) (1 thru 30=2)
              (31 thru 60=3) (61 thru 90=4) (91 thru 120=5)
          (121 thru 150=6) (151 thru 180=7) (181 thru 210=8)
          (211 thru 240=9) (241 thru 270=10) (271 thru hi=11)
recode V48 to V50 (lo thru 25=1) (26 thru 50=2)
                  (51 thru 75=3) (76 thru 100=4)
recode V51 (0 thru 0=1) (1 thru 50=2) (51 thru 100=3)
                  (101 thru 150=4) (151 thru 200=5)
                          (201 thru hi=6)
recode V47 (0 thru 0=1) (1 thru 50=2) (51 thru 100=3)
                  (101 thru 150=4) (151 thru 200=5) (201 thru 250=6)
                  (251 thru 300=7) (301 thru 350=8) (351 thru 400=9)
                  (401 thru 500=10) (501 thru hi=11)

frequencies variables =all/statistics=all/barchart
execute
```

```
title 'Ei Reference Desk - Questionnaire 2'
data list file=test  records=5
 /1 caseno 1-4 user 5-10 dept 11-12 V1 13-18 V2 19-24 V3 25-30 V4 31-36
    V5 37-42 V6 43-45 V7 46-48 V8 49-51
 /2 V9 5-8 V10 9-14 EMS1 15 EMS2 16 EMS3 17 EMS4 18 EMS5 19 EMS6 20
    EMS7 21 EMS8 22 EMS9 23 EMS10 24 EMS11 25 EMS12 26 EMS13 27 EMS14 28
    EMS15 29 EMS16 30 V11 31-32 V12 33 V13 34 V14 35 V15 36 V16 37-41
    V17 42 V18 43-44 V19 45-49 V20 50
 /3 V21 5-9 PO1 10 PO2 11 PO3 12 PO4 13 PO5 14 PO6 15 PO7 16 PO8 17
    PO9 18 PO10 19 PO11 20 PO12 21 PO13 22 PO14 23 PO15 24 PO16 25 PO17 26
    PO18 27 PO19 28 V22 29-30 V23 31 V24 32 V25 33 V26 34 V27 35-39 V28 40
    V29 41-42 V30 43-47 V31 48
 /4 V32 5-9 V33 10-12 V34 13-15 V35 16-18 V36 19-23 V37 24-28 V38 29-33
    V39 34-38 V40 39-43 V41 44 V42 45 V43 46 V44 47 V45 48 V46 49
    V47 50-52 V48 53-55 V49 56-58 V50 59-61
 /5 V51 5-7 V52 8-9 V53 10-11 V54 12 V55 13 V56 14 V57 15 V58 16 V59 17
    V60 18 V61 19 V62 20
Variable labels  caseno 'case number'
                 user 'User details'
                 dept 'Department'
                 V1 'Use of CD-ROM Products'
                 V2 'Use of Microsoft Windows Software'
                 V3 'Use of Printed Engineering Index'
                 V4 'Use of Interlibrary loan service'
                 V5 'Use of,Online Service'
                 V6 'Number of Online Searches'
                 V7 'Use of Online Compendex Plus'
                 V8 'Number of Online Compendex Searches'
                 V9 'Chemdisc Search Years'
                 V10 'Compendex Plus Search Years'
                 V11 'Additional help via easy menu'
                 V12 'Source of help - Staff'
                 V13 'Source of help - help screens'
                 V14 'Source of help - handout'
                 V15 'Source of help - other'
                 V16 'Helpfulness of handout'
                 V17 'Comment'
                 V18 'Use of Ei Training Manual'
                 V19 'Helpfulness of training manual'
                 V20 'Comment'
                 V21 'Ei ondisc ease of use'
                 V22 'Additional help via Page One'
                 V23 'Page One Source of help - Staff'
                 V24 'Page One use of help screens'
                 V25 'Page One Source of help - Handout'
                 V26 'Page One Source of help - other'
                 V27 'Helpfulness of Page One handout'
                 V28 'Comment'
                 V29 'Page One use of training manual'
                 V30 'Helpfulness of training manual'
                 V31 'Comment'
                 V32 'Page One ease of use'
                 V33 'Time of compendex session'
                 V34 'Time of chemdisc session'
                 V35 'TIME OF PAGE ONE SESSION'
                 V36 'Mouse ease of use'
                 V37 'Windows ease of use - Ei ondisc'
                 V38 'Windows ease of use - Page One'
                 V39 'Menu screens ease of use - ondisc'
                 V40 'Menu screens ease of use - Page One'
                 V41 'Ei Subject Categories - Chem. Eng.'
                 V42 'Ei Subject Categories - Civil.Eng.'
                 V43 'Ei Subject Categories - Mech Eng'
                 V44 'Ei Subject Categories - Elec Eng'
                 V45 'Ei Subject cat. mining,metals,petro'
                 V46 'Ei Subject Categories - other'
```

```
V47 'Total number of refs retrieved'
V48 'Percentage of refs - very relevant'
V49 'Percentage of refs - relevant'
V50 'Percentage of refs - not relevant'
V51 'Number of refs to be reviewed'
V52 'Subject search before'
V53 'Search other sources'
V54 'References used for teaching'
V55 'References used for Research'
V56 'References used for Coursework'
V57 'References for general interest'
V58 'References useful to Colleagues'
V59 'References used in other areas'
V60 'Search Preference - By Yourself'
V61 'Search Preference - Intermediary'
V62 'Search Preference - Comment'
EMS1 'Easy menu - Word/phrase index'
EMS2 'Easy menu - Ei Subject headings'
EMS3 'Easy menu - Author name'
EMS4 'Easy menu - Author affiliation'
EMS5 'Easy menu - Title Words'
EMS6 'Easy menu - Journal name'
EMS7 'Easy menu - Conference options'
EMS8 'Easy menu - limit options'
EMS9 'Easy menu - Additional options'
EMS10 'Easy menu - Saved Search'
EMS11 'Easy menu - Add. Words/phrases'
EMS12 'Easy menu - Ei Classification'
EMS13 'Easy menu - Major Sub. headings'
EMS14 'Easy menu - Treatment codes'
EMS15 'Easy menu - Year of publication'
EMS16 ' Easy menu - Language'
PO1 'Page one - Browse'
PO2 'Page one - Alphabetical titles'
PO3 'Page one - Journal/issues'
PO4 'Page one - Search'
PO5 'Page one - Expression'
PO6 'Page one - Direct'
PO7 'Page one - Results'
PO8 'Page one - options'
PO9 'Page one - Search Assists'
PO10 'Page one - Word list'
PO11 'Page one - Operators list'
PO12 'Page one - field list'
PO13 'Page one - previous search'
PO14 'Page one - Assists'
PO15 'Page one - Edit Annotation'
PO16 'Page one - Return to Annotation'
PO17 'Page one - Place bookmark'
PO18 'Page one - Return to bookmark'
PO19 'Page one - Show journal title'
```

Value labels
```
        dept    1 'Mech Eng'
                2 'Elec Eng'
                3 'Chem Eng'
                4 'Manuf Eng'
                5 'Civil Eng'
                6 'Trans Tech'
                7 'EDI'
                8 'CES'
                9 'Chem'
               10 'Des Tech'
               11 'Bus Sch'
               12 'Hum Sci'
               13 'HUSAT'
               14 'DILS'
```

```
                    15 'Physics'
                    16 'IPTME'
                    17 'External'
                    18 'Comp Stu'
                    19 'Geog'
                    20 'Pilk Lib'
                    21 'Math'      /
user    100000 'Staff'
                    10000 'Research Assistant'
                    1000 'Postgraduate Research'
                    100 'Postgraduate Course'
                    10 'Undergraduate'
                    1 'Other'     /
   V1 to V5   100000 'Daily'
                    10000 'Weekly'
                    1000 'Monthly'
                    100 'Quarterly'
                    10 'Yearly'
                    1 'Never'     /
   V6, V8 1 'from 0-3' 2 'from 4-6' 3 'more than 7'/
   V7      100 'Yes'
                    10 'Unsure'
                    1 'No'   /
V9      1000 '1984/5'
                    100 '1986/7'
                    10 '1988/9'
                    1 '1990/91'
                    0 'not used'
                    1100 '1984-1987'
                    1110 '1984-1989'
                    1111 '1984-1991'
                    110 '1986-1989'
                    111 '1986-1991'
                    11 '1988-1991' /
V10     100000 '1986'
                    10000 '1987'
                    1000 '1988'
                    100 '1989'
                    10 '1990'
                    1 '1991'
                    110000 '1986-1987'
                    111000 '1986-1988'
                    111100 '1986-1989'
                    111110 '1986-1990'
                    111111 '1986-1991'
                    11 '1990-1991'
                    111 '1989-1991'
                    1111 '1988-1991'
                    11111 '1987-1991'
                    0 'not used'
                    11000 '1987-1988'
                    1100 '1988-1989'   /
   V12 to v14, V54 to V58    0 'not used' 1 'used' /
   V29,V18,V11 , V22,V52, V53    10 'Yes'
                    1 'No'   /
   V16, V19, V27, V30  10000 'Very helpful'
                    1000 'helpful'
                    100 'adequate'
                    10 'unhelpful'
                    1 'Very unhelpful' /
   V21, V32, V36 to V40 10000 'Very easy'
                    1000 'easy'
                    100 'Average'
                    10 'difficult'
                    1 'very difficult' /
   V23 to V25 0 'not used' 1 'used' /
```

```
                    V33 to V35 1 '0 minutes' 2 '1-30 mins'
                               3 '31-60 mins' 4 '61-90 mins'
                               5 '91-120 mins' 6 '121-150 mins'
                               7 '151-180 mins' 8 '181-210 mins'
                               9 '211-240 mins' 10 '241-270 mins'
                               11 'over 271 mins' /
                 V41 to V45, V60 to V61 0 'no' 1 'yes' /
                 V46    6 'Manufacturing Eng'
                        7 'Chemistry'
                        8 'Optical eng'
                        9 'Materials Eng'
                       10 'Eng design'
                       11 'Computing'
                       12 'Trans Tech'       /
                 V47 1 '0 refs' 2 '1-50' 3 '51-100' 4 '101-150' 5 '151-200'
                     6  '201-250' 7 '251-300'  8 '301-350' 9 '351-400'
                    10  '401-500' 11 'more than 500' /
                 V48 to V50 1 '0 to 25%' 2 '26 to 50%' 3 '51 to 75%'
                            4 '76 to 100%'  /
                 V51 1 '0 refs' 2 '1- 50' 3 '51-100' 4 '101-150' 5 '151-200'
                     6  'more than 201' /
                  V52 to V53    1 'Yes'
                     2 'No'  /
                 EMS1 to EMS16, PO1 to PO19 0 'not used' 1 'used'   /
                 V59,V15,V17,V20,V26,V28,V31,V62 0'Not Used' 1'Used'/
recode V6 V8 (lo thru 3=1) (4 thru 6=2) (7 thru hi=3)
recode V33 to V35 (0 thru 0=1) (1 thru 30=2)
                  (31 thru 60=3) (61 thru 90=4) (91 thru 120=5)
                  (121 thru 150=6) (151 thru 180=7) (181 thru 210=8)
                  (211 thru 240=9) (241 thru 270=10) (271 thru hi=11)
recode V48 to V50 (lo thru 25=1) (26 thru 50=2)
                  (51 thru 75=3) (76 thru 100=4)
recode V51 (0 thru 0=1) (1 thru 50=2) (51 thru 100=3)
                  (101 thru 150=4) (151 thru 200=5)
                         (201 thru hi=6)
recode V47 (0 thru 0=1) (1 thru 50=2) (51 thru 100=3)
                  (101 thru 150=4) (151 thru 200=5) (201 thru 250=6)
                  (251 thru 300=7) (301 thru 350=8) (351 thru 400=9)
                  (401 thru 500=10) (501 thru hi=11)


crosstabs tables=EMS1 to EMS16 by dept/statistics=chisq/cell=count column row
crosstabs tables=V48 to V50 by V47/statistics=chisq/cell=count column row

execute
```

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APPENDIX F

TECHNICAL PROBLEMS ENCOUNTERED BY THE GENERAL LIBRARY USERS:- COMMENTS

EI REFERENCE DESK

The following comments were made by general library users regarding technical problems encountered whilst using the Ei Reference Desk.

"The EIRD crashed after 28 records viewed".

"Page One/Browse - Journal issue would not display contents. By quitting and starting again contents appeared".

"Compendex plus crashed after printing 6 pages".

"The EIRD went down after 26 records - opening Menu after retry? Abort".

"EIRD quit after 60 seconds. 'Retry' asked me to close and reboot computer".

"Programme crashed whilst printing and needed to be rebooted".

"Programme crashed when new search made. (F9 restart was pressed). Rebooted system".

"Crashed when paging down references. System violated on three occasions (using Compendex Plus)".

"System crashed within 30 seconds of starting search".

"Crashed while printing".

"When printing, requires to repeat command to print before actually printing anything".

"When clicking twice on the icon on starting, the dialog manager did not come up. Had to reboot system before it was displayed".

"While displaying records from selected search strategy, it crashed. A system's error message was indicated. File allocation bad on drive C".

"Crashed whilst printing references".

"Crashed - error on drive E when listing out title lists during search. Crashed again".

"Crashed through title list error drive E 1991 Compendex Plus".

"Printed the wrong references - different to the ones on view and selected".

"Error drive E 1986 and 1990".

"Crashed twice while looking through references".

"Page 1 - did search - 5 references - asked to view screen said Page 1 memory was full and jammed! Had to reboot".

"Page One. Jam on author. Cannot write to disc".

"Problem with saving a second search strategy. The second search combined with the first to produce a different strategy. Although we had the choice to 'replace' strategy infact it did not replace. Eventually the strategy had to be typed on each disc. The first strategy was saved with no problems. The test group member did select to 'Begin a new search' which should have cancelled the previous search".

"I was displaying titles with reference to Bentonite and the machine crashed and told me to abort or retry".

"Violated system".

"Drive error. Reboot system. Drive E".

"Drive error - failed to load new disc - drive E. ACTION - Reboot system".

"Compendex Plus - 1988".

"Ei application violated 'Windows' system whilst viewing record 6 of 10".

"Drive E, 1988 - as above (twice!!)".

"Whole system jammed when typing in author name - Twice!".

"Compendex 90 disc am. Error drive E when printing".

"Error drive E when printing pm".

"Drive failure E when searching".

"Drive failure on E - four times".

"Drive failure on C".

"While viewing titles - hard disc failure on C".

"This application has violated system integrity reboot system. While printing records".

APPENDIX G

SEARCH DATA FORM

Search Data Form

Search Number _____   Search Dates _____

Title							
Search Method							
Dates							
Search Strategy Total no. of hits Search time							
End User Search							

Search Strategy

Total no. of hits

Relevant hits

Search time

APPENDIX H

EI REFERENCE DESK USE FIGURES

EI REFERENCE DESK
LOUGHBOROUGH UNIVERSITY OF TECHNOLOGY

Table H1: Department Use of the Ei Reference Desk (October 1991 - July 1992)

DEPARTMENT	USE IN HOURS
Centre for Extension Studies	1.0
Chemical Engineering	9.5
Chemistry	10.5
Civil Engineering	56.5
Computer Studies	4.0
Design and Technology	3.5
Electronic & Electrical Eng.	44.5
Engineering Design Institute	26.5
Geography	3.5
Human Sciences	2.0
Institute of Polymer Technology and Materials Engineering	26.0
Manufacturing Engineering	50.5
Mathematical Sciences	1.0
Mechanical Engineering	37.5
Pilkington Library	23.0
Ei Research	205.5
Transport Technology	16.5
Other (External)	7.0
TOTAL	528.5

EI REFERENCE DESK
LOUGHBOROUGH UNIVERSITY OF TECHNOLOGY

Table H2: Use of the Ei Reference Desk by Status (October 1991 - July 1992)

STATUS	USE IN HOURS
Academic Staff	92.5
Project Staff	205.5
Research Assistants	63.5
Postgraduate Research	55.5
Postgraduate Course	76.0
Undergraduates	28.5
Other	7.0
TOTAL	528.5

APPENDIX I

EI REFERENCE DESK USE FIGURES FOR
TEST GROUP MEMBERS

EI REFERENCE DESK
LOUGHBOROUGH UNIVERSITY OF TECHNOLOGY

Test Group Members

Table I.1:   Departmental use of the Ei Reference Desk (March - July 1992)

DEPARTMENT	USE IN HOURS
Chemical Engineering	7.0
Civil Engineering	10.0
Computer Studies	3.0
Electronic & Electrical Eng.	20.5
Geography	3.0
Institute of Polymer Technology and Materials Engineering	3.0
Manufacturing Engineering	31.5
Mechanical Engineering	20.5
Transport Technology	14.5
TOTAL	113.0

Table I.2:   Use of the Ei Reference Desk by Status (March - July 1992)

STATUS OF TEST GROUP MEMBERS	USE IN HOURS
Academic Staff	49
Research Assistants	37
Postgraduate Research	22
Postgraduate Course	3
Undergraduate	2
TOTAL	113

APPENDIX J

ILL AND PATENT REQUESTS BY LUT ENGINEERING AND ASSOCIATED DEPARTMENTS

Table J.1: ILL and Patent Requests by Engineering and Associated Departments Between August 1991 and July 1992

Department	ILL Requests	Patent Requests	Total
Chemical Engineering	275	5	280
Civil Engineering	497	2	499
Design Technology	7	0	7
Electronic and Electrical Engineering	349	13	362
Engineering Design Institute	62	10	72
Institute of Polymer Technology & Materials Eng.	237	56	293
Mechanical Engineering	231	7	238
Manufacturing Engineering	411	11	422
Transport Technology	78	4	82
TOTAL	2147	108	2255

Total number of requests by all departments - 6533

Total number of requests ordered through the Ei Project during the five month test period = 731

Table J.2: ILL and Patent Requests by Engineering and Associated Departments Between August 1992 and July 1993

Department	ILL Requests	Patent Requests	Total
Chemical Engineering	372	15	387
Civil Engineering	690	0	690
Design Technology	21	3	24
Electronic and Electrical Engineering	351	9	360
Institute of Polymer Technology & Materials Eng.	392	19	411
Mechanical Engineering & EDI	441	121	562
Manufacturing Engineering	673	75	748
Transport Technology	163	0	163
TOTAL	3103	242	3345

Total number of requests by all departments 10721

APPENDIX K

ENGINEERING INFORMATION INC. PRICES
FOR PRODUCTS AND SERVICES

APPENDIX K

Engineering Information Inc.   Prices for Products and Services 1992

The costs of the various information retrieval products are listed below.

The Printed Engineering Index Monthly	$2260
The Printed Engineering Index Annual	$1640
Ei Compendex Plus CD-ROM five year backfile	$4920
Ei Page One	$1975
Ei ChemDisc ten year backfile	$3850

Ei DDS Document Charges

Basic fee (up to 20 pages). Turn around time is 5 to 7 working days	$15.00
Additional pages over 20 (each)	$0.40
Publisher copyright royalties over $3.00	at cost
Handling per document	$1.00
Rush service same day (additional)	$15.00
next day (additional)	$10.00

Ei DDS Delivery Charges

First Class Mail

inside North America	no charge
outside North America	at cost

Air Mail

outside North America	at cost

Fax Transmission

up to 20 pages	$5.00
additional pages over 20 (each)	$0.30

Overnight courier or other rapid delivery   at cost