The impact of Z39.50 on library catalogues: OPACs on the world-wide web

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The Impact of Z39.50 on Library Catalogues: OPACs on the World-Wide Web

by

Tracy Maria Linton, B.A.

A Masters Dissertation, submitted in partial fulfilment of the requirements for the award of Master of Arts degree of Loughborough University.

September 1996

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Abstract

This dissertation examines the Z39.50 protocol and its effects on library catalogues. Chapter two focuses on the protocol, what it is, what it does and explores current projects involving the protocol. Chapter three examines the way subject searching takes place on a Z39.50 gateway, using three universities as examples. These university libraries were chosen as they still used both telnet and web platforms. The three university libraries: Loughborough University, U.K., Monash University, Australia, and Stanford University, U.S.A. are very different in size, subject speciality and location, and all three have web access to their catalogues. In order to compare both types of catalogue access on all three university systems, certain topics were considered important, the main ones being: interface/display, search points (including searches) and navigation around the system.

In chapter five conclusions are drawn from the dissertation suggesting that the introduction of access to library catalogues via the World-Wide Web produces some negative aspects along with many positive.
Acknowledgements

I would like to acknowledge the patience and guidance of my supervisor Ann O’Brien, and thank her for devoting considerable time and effort in helping the construction of this report. I would also like to thank my husband, Russ for his understanding and support.
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Chapter 1. Introduction

Most libraries have a system of computer terminals which enable the user to gain access to the library’s Online Public Access Catalogue or OPAC. The user can perform a variety of library tasks on the OPAC such as searching for books or subjects and even finding out his/her borrower details. These terminals connected to the library server are known as a Local Access Network or LAN. Remote access to library OPACs, is available over wide area networks or WANs usually through telnet, which is the network terminal protocol.

Until relatively recently telnet was the main way of accessing library catalogue databases from a remote location. Now, the internet has provided a means of sharing information in a manner accessible by all, from corporate to home user. The continued use of telnet is now in question.

The increasing popularity and incessant expansion of the World-Wide Web has indicated that it is a fundamental communication medium. There are four main characteristics of the web that may be responsible for its rapid growth and acceptance as the information delivery platform of the future (1).

- The web is a multimedia facility, it has the capability of displaying objects of several non-textural types, and for presenting unique styles of information.
- The web is highly interactive, allowing browsing of information through hypertext links embedded within the body of information.
- The web is highly accessible. It is a global media that permits the unrestricted dissemination and use of sets of information objects of all types.
• The web is also user friendly. This stems from the user being shielded from the underlying protocols used in information transfer, and display. In addition, the functionality of the web's own protocol (HTTP) is highly responsible for its ease of use.

These factors have prompted libraries to consider the web as an important information tool which may increase library usage and so benefit the library. It is then not surprising that libraries in all sectors are deciding to establish themselves on the web, with many library staff creating home pages for the library, and providing links to external servers. These home pages may include information about the library opening hours, computer facilities and guides as well as direct access to the library's OPAC.

Until recently most OPAC's were available through a telnet session, although this is still true for many libraries there has been a large increase in libraries creating a seamless connection between their users' web browsers and their OPACs. This interface between the web and OPAC allows searches to be conducted using the library catalogue without having to negotiate separate protocols. Users then are able to create search queries, send them, and receive the results all in the environment of their web browser rather than in the course of a telnet session.

This dissertation intends to examine library catalogues both in their traditional OPAC format via telnet and in the more recent World-Wide Web, or WWW format. The implications of the Z39.50 protocol on library systems and the information they provide will also be examined in detail.

Chapter 2 focuses on the American standard Z39.50, this client server protocol allows one computer system (the client), to search and retrieve
information from another computer system (the server). This standard grew out of a project to develop a way of enabling electronic bibliographic records held at different library sites to be mutually accessible over networks. Effectively Z39.50 is a language that enables non compatible databases to communicate. It allows the user retrieve information, and conduct simultaneous searches of multiple databases. The standard also recognises files with multimedia components such as sound and images.

This protocol has the potential of changing library services, as libraries are beginning to use the Z39.50 gateway with a WWW interface. The protocol brings closer the possibility of common gateways of information, and distributed library systems. This chapter explores some of the many research projects involving Z39.50, and finally a working Z39.50 gateway at Michigan State University is explored using subject searches.

In order to examine some of the details of the new incarnations of library catalogues using the WWW, it is aimed to analyse a specific feature of the catalogue interfaces and use the comparison of results as a basis for discussion. Chapter 3 looks closely at the ‘search’ capabilities of web interfaces, and the approach to searching, taken at a chosen selection of locations. Three web sites from the following universities; Stanford University, U.S.A., Monash University, Australia, and Loughborough University, U.K, are explored. The subject searching facilities at each site are examined, and the types of subject search available at each university are compared. Subject searches are carried out on each system and the results compared and comments made. From these searches it is hoped that some insight can be gained into how each system searches.

Chapter 4 compares the telnet system of presenting library catalogues against
the web platform, for each of the universities discussed in chapter 3. The following issues will be considered:

- Interface (including display and menu).
- Search points (including sample searches).
- Information given to the user.
- Links to related searches.
- Search modification.
- Results layout.
- Navigation.
- Help pages.

The differences and similarities between the two platforms on each of the three catalogues will be examined, and positive and negative aspects of each will be discussed to ascertain if the web catalogue provides any added advantages over the older telnet system. By comparing the two types of catalogue presentations it is hoped that the strengths and weaknesses of each system will be clearly seen.

In order to provide further comparison searches are carried out on each of the systems, to consider the type and amount of information that is provided for the user, and questions considered such as is the information provided the same on each system? If it is not, how does it differ? Finally general comments will be made about the telnet system and the web systems.

Chapter five will examine the effects of the web presentation of library catalogues and the implementation of Z39.50 on the future of OPACs.
References

Chapter 2. Z39.50: An Overview

2.1 Z39.50

Perhaps Lorcan Dempsey was right when he wrote that the name of the search and retrieve protocol Z39.50, sounded as 'if it had come from the planet Krypton, so shorn is it of any clues about its meaning' (1). This chapter will set out what Z39.50 is, what it does, and explore some of the Z39.50 projects taking place. In conclusion subject searching using a Z39.50 gateway will be explored.

Z39.50 is an American National Standard adopted in 1988, developed by the National Information Standards Organisation (NISO), the ANSI - accredited standards making body responsible for publishing, libraries and information services standards. It is a retrieval protocol which allows client applications to search databases on remote servers retrieve results, and carry out related retrieval functions (2). Version three of this protocol Z39.50 - 1995 has just been approved. The technical development work for Z39.50 is mainly carried out by the Z39.50 implementors' group (ZIG), consisting of 'institutions and vendors interested in developing a Z39.50 support capability' (3). The Library Of Congress is the maintenance agency responsible for providing a list of Z39.50 implementors, and coordinating technical reports.

Another standard, developed in parallel to Z39.50 is the Search and Retrieve ISO (International Standards Organisation) 10162/3. This SR protocol has only really been implemented in Europe, the mass of developmental effort being spent on Z39.50 in the U.S. (4). The SR protocol is a subset of the Z39.50 protocol and has less functionality, and thus is less often implemented. In addition the protocols themselves are implemented in different environments and this causes problems, as they cannot
communicate with each other. At present there is talk of the two protocols converging as Dempsey, Russell and Kirriemuir say, 'a decision is about to be taken as to whether SR adopts Z39.50-1995 in its next version' (5). Research projects such as Europagate are working on a gateway which will enable both protocols to communicate with each other.

The Z39.50 standard was initially developed to overcome problems associated with multiple database searching such as having to know their unique menus, command language and search procedures of each system. The Z39.50 method of information retrieval is different from the traditional method commonly employed for database searching. A local terminal is used to log into a remote system but then adopts that system's unique menus and command language. This requires training of the user to gain the most from these individual systems in order to perform these searches effectively. The Z39.50 protocol simplifies this by allowing the use of the interface of the local system to search local and remote databases.

This protocol operates in a client/server environment, in this environment two computers interact in a peer to peer relationship, with each computer having set functions to perform. The client software requests services or information, and the server software makes that information or those services available (6). In the Z39.50 environment the client is known as the origin and the server is known as the target.

A request from the user application at the client end is translated into 'Z39.50' by the origin and sent to the target. At the server end, the target translates the request into a form understandable by the database application, which processes the request, locates the required information and returns it to the target, which then in turn passes it back to the origin. According to Dempsey,
Z39.50 'defines the mechanics of interaction, an apparatus for the expression of the syntax and semantics of queries and formats for the exchange of data' (7). This means that the client software and the server software can be produced separately, it is just the output of each which is converted into the protocol formats for transmission.

As Lynch says ‘through Z39.50 a client system views a remote servers database as an information resource, not merely as a collection of data’ (8). The communicating computers share an understanding of the semantics of the data that are being selected on one machine and moved to another, thus transforming that data into information. Parts of the protocol such as the attribute set allows terms and characteristics to be defined, capturing the semantics of a particular area. The attribute set BIB-1 includes a range of elements typically found in bibliographic applications. Results are communicated as records, a number of record formats are acknowledged i.e. MARC (9).

In a Z39.50 session there is communication is between the origin (Client) and Target (Server). This communication is known as an association. The origin and the target communicate by Protocol Data Units (PDUs), which usually work in pairs. The former to the target is usually a request and the latter to the origin is usually a response. The initialise request and response begin the association and it is during this that parameters are defined such as the version of Z39.50 that can be used, and establishes whether the origin and target can work together.

The Z39.50 session can consist of several services which are explained below, this section is principally taken from Dempsey, Russell & Kirriemuir, Towards distributed Library systems: Z39.50 in a European Context (10).
The Initialisation Service

During this the initialise request PDU is passed from the origin to the target, and the reply from the initialise response PDU in the opposite direction. This association establishes whether the origin and target can operate together, by defining parameters acceptable to both, such as the version of the Z39.50 standard to be used.

The Search Service

Deals with search requests. The Search request PDU, sent from origin to target, contains the user's query, formatted into a Z39.50 compliant state. The target takes this query, carries out a search on the database, and stores the results. It then sends a search response PDU back to the origin giving details of the results. The results themselves are not transmitted to the origin, only details about them.

The Present Service

The origin can request a set of results. The present request PDU is used to specify that some set or subset of results from a previous search should be sent to the origin.

Access Control

This covers security measures. The access control PDU must be sent by the target to the origin which must respond with a valid Access Control Response before any other operations are carried out within the current association.

Resource Control

Covers the use of resources within the current association, decides if requests are too resource intensive or not. If they are the service will be terminated.

Delete Service

The origin can request that the target deletes one or more sets of results. As new versions of the protocol are produced new stages will probably be added to these.
When the Z39.50 protocol takes place between computers the users should not see it or even be aware that they are using it. The protocol can be part of a library system or a stand alone application, allowing structured record retrieval.

2.2 Current Research

Z39.50 potentially can affect many areas of information work, in this section we will look at some publicly funded projects that use this protocol.

2.2.1 Protocol Gateway

It has already been mentioned that Z39.50 and SR do not operate in the same environment. In order to gain the widest choice of servers it may be necessary for a library to use both systems, if this is not desirable a different solution must be found. The Europagate project suggests that a gateway that can interact between Z39.50 + TCP/IP or SR+OSI acting as an intermediary is the answer.

Europagate

Europagate is funded under the Libraries Programme of the European commission the project partners being:- University College Dublin, Danmarks Tekniske Bibliotek (Denmark), Chomhairle Leabharlanna (Ireland), and Consejo Superior de Investigaciones Cientificas (Spain). The project is intended to build the protocol gateway, provide an Email facility for access to online catalogues supporting SR or Z39.50, and identify practical problems associated with existing standards. It is hoped that the gateway will be available commercially (11).

2.2.2 Distributed Library Systems

Perhaps the greatest interest and most of the research has been centred on the realisation that the Z39.50 protocol has the ability to provide a distributed
library system. A distributed library system is one where data and services may be provided from many different places, but appear to the user as a single system (12). This has many benefits for the library it may mean smaller costs as the cost of such a system can be spread between all the cooperating libraries. For the user it means the ability to search many libraries catalogues at once, in a more user friendly environment.

**IRIS**

One of the first operational distributed library systems in Europe is the Iris system, this allows users to search for and request items of interest from the catalogues of six Irish libraries. Iris began from a decision that rather than create a union catalogue the sharing of resources would be more desirable. Initial funding of £IR 600,000 came from the Telematique programme under the European Development Fund in 1992. The universities involved are: Dublin City University, Trinity College Dublin, University College Dublin, University College Galway, University of Limerick, and Forbairt (National Science and Research Agency). The libraries involved all implemented Z39.50 server capabilities in association with their library systems (URICA, BLCMP, Dynix and Oracle) (13).

All users initially connect to the IRIS client host searching, requesting, management and accounting services are all converted to Z39.50 and passed by a Z39.50 client to a target library. Iris allows several Z39.50 connections to be opened simultaneously, the system collates results and returns them in a meaningful way.

**ONE**

One began in 1995 involving 8 countries and fifteen participants. It is coordinated by BROD the research and development department of the Norwegian School of library and information science. The project plans to connect the OPACs of the participating national libraries and cataloguing
services offering the service of accessing all catalogues on a single entry point (14). Most of the participants are already developing services based on SR or Z39.50 so plan to use existing systems as a basis for further development. Project aims include plans to produce origin and target public domain software able to run over Internet and OSi protocol, and establish a pan European OPAC network.

**Electronic Document Delivery**

The Dali (Document and Library Integration) project funded under the European Libraries Programme began in 1995. Intended to 'develop, pilot, and evaluate a service for multimedia and document delivery in a distributed environment using SR.' (15)

The project aims to deliver an integrated service for search and delivery of items to the end user whilst hiding the mechanics of the system provider. The universities involved are: Sheffield, University College Dublin, Thessaloniki and Kyros universities. The project can be seen as an extension of IRIS, adding a range of multimedia document delivery services. Dali users transparently search a distributed catalogue but when an item is requested the system decides the best way of servicing a request. A book may be ordered in the traditional way, whilst a document may be emailed or faxed or physically sent. The charge for the system is dependent on the nature of the information.

**Cataloguing Network Resources**

The Catriona Feasibility Project (Cataloguing and retrieval of information over networks applications), was funded by the British Library Research and Development department and took place at Strathclyde University. The study was for Six months ending in January 1995. The project was aimed at ensuring that 'the growing range of electronic resources available at an institution is exploited to its fullest, both in the institution itself and if so desired
from beyond.' (16). The Catriona Project suggests that the best way of doing this is to catalogue these resources and make them available via network accessible OPACs.

The study suggested that the idea of a distributed catalogue of internet resources integrated with a Z39.50 compliant library OPAC, attached to a library management system is a practical possibility. In the feasibility study Strathclyde's Z39.50 Gui OPAC client conducts retrieving USMARC records including URLs in the 856 subfield $u$, automatically loading an appropriate browser in Mosaic or Netscape (17).

It is hoped that funds will be raised for a Catriona demonstrator project that aims to create a library based world wide distributed catalogue of internet resources accessible through a network of 'Union' OPACs.

2.3 Commercial Applications

Applications for Z39.50, are not just limited to research or academic libraries the protocol is being used by various companies to enhance their products.

2.3.1 Commercial Database Companies

Ovid technologies (the database company) are using the Z39.50 protocol to enhance their product making it more user friendly. The company produces over 80 databases has integrated the protocol to enable all databases to operate under one single interface making the user only need to learn one interface instead of several (18). This use of Z39.50 producing a more user friendly product makes commercial sense.

2.3.2 Library Automation Companies

Producing several off the shelf Z39.50 units many libraries not have the
money or the inclination to do their own Z39.50 development, instead they prefer to purchase the software from the many systems available from library automation companies. Libraries can either obtain fully integrated client systems which will use the standard OPAC or buy a stand alone product. The integrated clients offer the familiar user interface for local and remote searching, stand alone clients do not have this facility. Most systems on the market are geared towards the larger academic library. It can be seen with libraries ever expanding range of user services, it is unlikely that one supplier will ever be able to cater for all these services so mixing and matching of modules and services from various sources is likely to become increasingly common. With this in mind Z39.50 will become even more relevant in order to link these parts together.

2.4 Subject Searching Using A Z39.50 Gateway
Michigan State University
Web Access: http://zweb.cl.msu.edu/

It has already been shown how the Z39.50 protocol aims to revolutionise searching. Several institutes have their own Z39.50 gateway, Michigan State University’s gateway is called ZWEB. This gateway allows the user to choose between 39 catalogues in many different American institutions. In this section the ZWeb facility will be explored the searches and the information it provides.

2.4.1 Search Points
The ZWeb gateway allows the user to choose from the catalogues of 39 institutions, the user chooses by either highlighting the catalogue of his/her choice using the scrolling menu then pressing the ‘GO TO’ button or, by entering an area i.e. Michigan. If the user chooses the institution of choice first
the 'GO TO' button will provide the user with access to this institution and a different screen will appear, if the later option is chosen by the user they will be given a smaller list of options in this case catalogues in Michigan. The user then has to choose one catalogue from the eight in the Michigan area from a scrolling menu and press the 'GO TO' button (Fig. 2.1).

The 'HELP' page does explain that the types of searches available on each catalogue is variable although they operate with the same interface.

**Searches**

In order to explore the search capabilities of the ZWeb gateway it was decided to conduct two subject searches one general and one more specific. The following terms were chosen:

a. Human Biology.

b. Porphyria.
It was decided to use the catalogue of 'Wayne State and Detroit area Libraries' to explore the search facilities of the system. The interface for the library catalogue was a form type with boxes for the user to type in a subject search or a title, author or Keyword search. There was also a choice of searching for a word or phrase, the user could choose the number of records to be retrieved, and the way the material was to be presented (Fig. 2.2).

![Netscape - Wayne State and Detroit Area Libraries](image)

Fig. 2.2

The first search for Human Biology produced 397 hits. These were displayed alphabetically by title in groups of ten. Further information about the title could be produced by 'clicking' on the title that was required. Further information would give the user the following information: Author, title, subject fields (in which the two words of the search term appeared together), publisher, description, notes, ISBN. Holdings information was also given in the form of a table.
When the search was used again with the specification that the search should be a 'phrase' search instead of a 'word' search Human Biology produced 218 hits, this was because the search was more specific.

The second more specific search produced 24 results but this would be expected because of the specialised nature of the subject.

2.4.2 Navigation
The system was very easy to navigate with 'BACK' and 'FORWARD' buttons on every screen, and a help icon on every screen. The 'HELP' page was very detailed and relatively jargon free.
References

2. Ibid., pp. 2.
4. Ibid., pp. 4.
13. Ibid., pp. 2.
17. Ibid., pp. 2.
Chapter 3. Subject Searching On University Web Sites

3.1 Introduction

This chapter's aim is to examine the library catalogues of three universities; Loughborough, Monash, and Stanford. Some brief historical and technical details of the universities are given, and an analysis of the different user interfaces is performed, though this is considered thoroughly in Chapter 4. The main part of the chapter is devoted to subject searches available and the results from these searches.

3.1.1 University Site Details

The three catalogues to be explored are based in libraries which have very different histories, so it is perhaps not surprising that the size of the catalogue databases varies between these institutions, from the 3.2 million records of Stanford, to the 500,000 records of Loughborough.

Loughborough University began as Loughborough College in 1909, eventually gaining University status in 1966. It now has a student population of over 9000. It is a campus based university and has one library 'The Pilkington Library', which contains items covering all the subjects taught at the university. The Library issued over 400,000 books in 1994/95 and this number is expected to increase as student numbers rise. It is committed to increasing multimedia resources, and actively involves itself in academic research (1).

Stanford University near San Francisco was founded in 1891 by Leyland Stanford, and now has a student population of over 14000. The university has a stock of over 6.5 million items, contained in 13 main libraries and 5 coordinate libraries. Each library contains items of a particular subject area
i.e. Engineering, and these libraries sponsor educational activity and take an active role in teaching. The library research facility invests in new technology and has its own experimental Z39.50 gateway (2).

Monash University was founded in 1961 by an act of parliament. It is the largest university in Australia by student size, having over 40000 students. It has three main libraries plus another eight branch libraries, with a stock of over 2.2 million volumes. It has experienced a large growth in student numbers partly due to its investment in information technology, including its virtual library project, network facilities and internet resources. It also has a commercial information service MONIFO (3).

### 3.1.2 Interfaces / Display

The user interfaces for the catalogues vary, Loughborough presents its catalogue as a page with a series of buttons, each button corresponding to a search term. The user then is instructed to click on the search term of their choice and begin the search. Web access to Monash University’s catalogue Sesame 2, has the same large number of searches that are available to the user on their telnet system. The user is presented with a series of boxes, the search type box requiring the user to highlight the search required. Stanford University’s DB-Connect presents its interface as a form to fill in search terms are simplified to Author, Title, Subject and Corporate Name so the user has a much smaller choice of searches on the DB-Connect than on the equivalent telnet system.

In all three interfaces there is very little explanation of search terms although all three have links to a ‘Help’ page. This is especially lacking in the Monash catalogue which gives the user a large number of search points which are often described in technical language.
Monash and Stanford allow the user to limit the searches at the input stage, both allow the user to limit the date of material to be retrieved and the number of items retrieved. These systems also allow the user to narrow the search down to a particular branch of the university library. After a search is completed on the Monash system the user is given the opportunity to narrow the search again by filling in a box underneath the search results grid. Stanford gives the user the opportunity to use a series of Boolean operators between search types so the search can be tailored to the specific requirements of the user.

3.2 Subject Searches

The following search terms were chosen to explore the types of subject search available on the three university catalogues:

a) Nuclear Energy.

b) Global Warming.

The first search term can be seen to be a general term, the second more specific search. The broader more general search term would be expected to produce a larger number of results than the more specific term. It can be seen that the names of the search type may differ between universities, making it important to explore how the database is searched, it is hoped that by using the above search terms this can be done.

3.2.1 Loughborough

The Loughborough Talisweb system by BLCMP used a system based on a classified catalogue structure. The two types of search executed were 'Subject' and 'Keyword'. The subject search results indicated that any term that is typed into the system is matched against a subject index that is unique to Loughborough. If there is no match between the term typed into the system
and the index, the system will not be able to search for that term if it is not a ‘preferred’ term. If the search term does match a term in the index the system will produce a list of classmarks rather than individual items. These classmarks can be expanded to reveal all the items with that classmark in the library. The user could then browse through all the items in a particular classmark.

The subject search for Nuclear Energy produced for the user a list of 10 classmarks, each classmark having a title containing the two words of the search term such as, ‘Nuclear Energy: France: Public Administration 354.4400823’. If the user then wished to browse through the items in any one classmark a ‘click’ on the classmark of choice would produce a list of all items contained in that classmark in the library.

The term Global Warming was not a preferred term so did not produce any results. The ‘Keyword’ search produced a list of items, many of these items had titles containing both words of the search term, but this was not always the case. This appears to be a much broader search as it produced a larger result.

The Loughborough system did not provide such additional information as the subject fields or subject strings for any item, which meant it was difficult to ascertain exactly how the system searched and retrieved items. This was in marked contrast to both Stanford and Monash which both provided the user with detailed bibliographic records including subject fields.

3.2.2 Monash
Monash University’s catalogue provides the user a large, but perhaps too complicated choice of search types. There are two types of subject search
'Exact Subject' and 'Subject Keywords' as well as an 'Exact Title' and 'Title Keyword' search. Despite the obvious jargon and confusion that can be caused by the similarities between searches there is no immediate help or explanation of the search types. The more general term Nuclear Energy produced the larger number of results.

The search results themselves were displayed without firstly telling the user how many results had been found, this could be confusing and waste time for the user who would be able to truncate the search if it was indicated on the screen how many items were found before the display was shown.

The 'Exact Subject' search at Monash provided a list of items all of which had both words of the search term listed together in the subject field, this search produced a much smaller number of items than the 'Subject Keyword' search. Subject Keyword produced a list of items which had the two words of the search term either in the title or subject field not necessarily together.

The 'Exact Title' search produced the smallest number of results as items retrieved had to have both words of the search term together in the title not necessarily at the beginning of the title however.

3.2.3 Stanford

The Stanford system provided two general searches compared to the four more specific searches of the Monash system. The two searches called simply 'Subject' and 'Title' both produced large numbers of results. The subject search provided items with the search terms in the title and listed subjects in the bibliographic details. The Stanford system instead of producing a large number of specific search types provided the user with a very flexible user interface.
As in the Monash system the Stanford system allowed the user to search related subject areas from a list of subjects provided in the bibliographical details. The title search produced items that contained the search term in the title not necessarily together.

3.2.4 Summary

As expected the Stanford system with its large database produced the greatest number of results for both search terms. The system's small in number, but more general search types retrieved a large number of records. Monash University has a larger, more specific number of search types that produce a smaller number of results (Tables. 3.1 & 3.2). These specific searches will provide greater benefit to those users who have a clearly defined requirement.

All three systems provide the user with the opportunity to perform related subject searches from information in their initial search results. The Monash and Stanford systems allow this by providing subject fields and topics in their item records. When subjects in these fields are 'clicked' on, further subject searching takes place to give the user details of other items in the library with the same topics in their bibliographic records. The Loughborough system provides related searches by Classmark (producing lists of items in a classmark) and by Author.

The two search terms have then shown the different ways that the three university systems provide subject search information to the user.
<table>
<thead>
<tr>
<th></th>
<th>Exact Subject</th>
<th>Subject Keyword</th>
<th>Exact Title</th>
<th>Title Keyword</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monash</strong></td>
<td>251</td>
<td>291</td>
<td>8</td>
<td>215</td>
</tr>
<tr>
<td><strong>Stanford</strong></td>
<td>4025</td>
<td>4025</td>
<td>1323</td>
<td>1323</td>
</tr>
<tr>
<td><strong>Loughborough</strong></td>
<td>11 classmarks containing 642 books</td>
<td>179</td>
<td>18</td>
<td>179</td>
</tr>
</tbody>
</table>

**Table 3.1** Search Results for subject term: Nuclear Energy.

<table>
<thead>
<tr>
<th></th>
<th>Exact Subject</th>
<th>Subject Keyword</th>
<th>Exact Title</th>
<th>Title Keyword</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monash</strong></td>
<td>94</td>
<td>94</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td><strong>Stanford</strong></td>
<td>345</td>
<td>345</td>
<td>114</td>
<td>114</td>
</tr>
<tr>
<td><strong>Loughborough</strong></td>
<td>Not an acceptable term</td>
<td>35</td>
<td>10</td>
<td>35</td>
</tr>
</tbody>
</table>

**Table 3.2** Search results for subject term: Global Warming
References


Chapter 4. Comparative searching: Telnet.v.Web

4.1 Loughborough University - Telnet

4.1.1 Telnet Access: liba.lboro.ac.uk
Telnet access is achieved via the above telnet code or using the access point on Loughborough University's web page.

4.1.2 Interface
The first screen of the Loughborough system welcomes the user, and instructs them to type the terminal type to be used. The interface itself functions as a series of screens, the user moving between these screens via options on a series of menus.

Menu
This system functions through the use of several small menus which the user can access by the use of the return and arrow keys on the keyboard. The first screen that appears after the user has indicated terminal type instructs the user to choose one of four options that appear at the top of the screen, these are 'Search', 'Borrower Services' and 'Other Catalogues', there is also an 'exit' key for the user to leave the telnet system if required (Fig. 4.1). Each of these options when chosen will reveal a small menu of further options. The 'Borrower Services' key gives the user information about his/her borrower status if they input their university identity number. The 'other catalogues' key reveals a series of other catalogues such as: serials, teaching practice, reference, new additions, LUT theses, Audio Visual, Open university, orders and short loan. The 'search' option reveals a menu containing the following choices: Author, Title, Keyword, author/title, author/keyword, subject index, classmark and number search (Fig. 4.1). There are other very small menus that occur throughout the programme, such as the options menu.
This system encourages the user to interact with the menu by using the arrow and return keys rather than imputing search codes. There are some commands that have to be typed in, these are largely commands that move the user between screens. These commands consist of the 'Esc' key plus a letter, usually the letter is the first of the command word. These commands are repeated at the bottom of every screen.

**Layout / Display**

This system uses screens, and boxes within these screens to display information. There is also use of red type to accentuate some commands. In general the screen is laid out using the top of the screen for the search headings and the bottom of the screen for commands.
4.1.3 Search Points

This system has a large number of searches available, these are: author, author/title, subject, title, author/keyword, classmark, keyword, number, reading lists. The user chooses which search he/she requires by pressing the return key, and the relevant search screen appears. The user must go back to the menu screen if he/she wishes to start a different search. The user then inputs a term in the space indicated on the screen and presses the return key.

Searches

In order to explore this system we will attempt the following searches.

a. Subject search - Russian plays.

b. Keyword search - Russian drama.

c. Author search - Shakespeare.

d. Author search - Shakespeare, William. (Fig. 4.2)

e. Subject search - Shakespeare.

![Author search interface screenshot](image-url)
a. When entered as a subject search term, this failed to retrieve any results. This was due to the fact that this term did not appear in the subject index that Loughborough University uses for retrieval.

b. This search yielded 38 results. The display of each item gave the user the title, author and classmark. If the 'Return' key was used again the user would be given the bar code, the loan status and the due return date of the item. A more detailed record of the item can be obtained by using the option command, and choosing 'title'. This then gives a fuller record of the title, author, publisher information, series and notes. The option command also allows a related search to be performed. This is quite a complicated process to retrieve information that is regularly necessary to the user.

c. This search produced a list of authors, the one that was relevant was chosen, and the return key pressed. This produced a list of 1326 titles.
d. Shakespeare, William also produced 1326 titles. Selecting the author presented a display (Fig. 4.4) showing, the authors works. If the 'Return' key was used again on an a particular work the user would be given the location, classmark, number of copies, and the loan status (Fig. 4.5). A more detailed record of the item can be obtained by using the option command, and choosing 'title' (Fig. 4.6 & 4.7). This then gives a fuller record of the author, title, publisher information, and series. As before this is quite a complicated process.

e. It was decided to subject search the term Shakespeare in order to explore the subject index as search term a. was not acceptable to the system. Inputting Shakespeare into the search gave a list of 8 subjects relating to William Shakespeare such as Jacobean Drama, accompanied by a classmark, selecting one of these subjects and pressing the return key would then give the user a list of all of the books available within this classmark. The subject lists are then really a list of classmarks.

Information given
In general the searches only gave a minimal amount of information regarding an item, very few notes or cataloguing records.

4.1.4 Navigation
This system was relatively easy to navigate between screens as the relevant commands were constantly displayed at the bottom of each screen. However, movement between screens to find full records was awkward, and it was necessary to return to first menu between searches. Also the user could not exit the system by typing a command, but had to return to the first screen.

Help
The screen always displayed the 'help' command which gave useful information, in general it was very easy to find your way around.
4.2 Loughborough University - Web

4.2.1 Web Access:
http://liba.lboro.ac.uk:8008/www-bin/www_talis
Web access is achieved via the above URL.

4.2.2 Interface
The first screen of the web page welcomes the user and gives them an Email address for the user to use to comment on the service. The opening screen also gave the user an access point for 'help' if required.

Menu / Commands
This system rather than having a menu and commands, uses a series of points which the user selects by using the mouse to gain further information. The screen gives the user a number of options including search types and functional commands, the user does not need to learn commands or menus.

Display / Layout
The system uses colours to distinguish important commands, each search has its own screen with one box for the term. Other results rely on overlaying one screen on top of another. Blue areas in general are the ones that conceal further information.

4.2.3 Search Points
The search points were set out as a series of buttons on the screen, they consisted of the following: author, author/title, subject, title, author keyword, classmark, keyword, number (Fig. 4.8). These are the same searches available on the Telnet system. The user has to type the term into a box and click on begin search.
Searches

The following were attempted:

a. Subject search - Russian plays.
b. Author search - Shakespeare.
c. Author search - Shakespeare, William.

a. The web system, gave no results, as the term did not appear in the libraries index system. This is consistent with the Telnet results, indicating that the searches are performed on the same index using a different interface.

b & c. Searches b and c produced 1326 results. The information retrieved was the same as the telnet system, the only difference between the two was the graphical interface to this information (Fig. 4.9 & 4.10).
Fig. 4.9

Fig. 4.10
4.2.4 Navigation

Navigation between screens was very easy at the end of every display there was a series of commands in blue to use including ‘Return to main OPAC’ and ‘return to subject search’. There was also a chance to reserve items or perform related searches.

Help

The system did offer some basic help but at the beginning of the search.

4.3 Stanford University - Telnet

4.3.1 Telnet Access: forsythetn.Stanford.edu

The above code gives the user access to Stanford’s online catalogue, called Socrates. Users with a Stanford university ID can also gain access to the university’s CD-ROM services through this Telnet code.

4.3.2 Interface

Initially Stanford’s system welcomes the user to Stanford and instructs him/her to type in an ID or the term SOCRATES plus the type of terminal to be used. The telnet interface operates by providing the user with a series of options on a number of screens, through which the user selects the information she/he requires.

Menu

The first menu that appears on the screen allows the user to indicate which university facility she/he wishes to access. By typing the word ‘select’ the user gains access to the Socrates catalogue.

The search menu then lists the search options available to the user with an example of each search type, there are only six basic searches listed initially,
but there are further searches available, and a help menu with a list of headings for the user to choose from if required.

**Commands**

The Stanford telnet system requires him/her to master a series of simple commands, the most important of these require the user to recall and type the full command word. These most important commands are not repeated unless the help command is typed. These most important commands are 'Find', to begin a citation search, 'Browse', to begin a search of headings, 'Display' or D to display results, 'Help' for the help page, and 'End' to finish the Socrates session.

Each search type is also allocated a command code, these consist of the first letter of the search type, so for example the code for an author search would be 'A', these are then easily remembered.

**Layout and graphics**

The telnet system at Stanford does not use graphics or icons to illustrate searches, instead it uses blue typeface on a white screen. The screen in this system is generally split into three different areas, each area is used for a different function. The top of the screen tells the user which search she/he is accessing i.e. 'SOCRATES/ FIND/ SUBJECT/ Russian Drama/ Number of headings found= 119'. The middle of the screen displays the results, a 'full display' showing the author, title, publisher, location and classmark. The lower third of the screen would be used to display further commands, as well as repeating the 'help' command, the 'scan' command and the 'display' command.

**4.3.3 Search Points**

The Socrates online catalogue employs a series of search menus and commands to help the user produce a successful search. There are two
search menus used by Socrates (Fig. 4.11 & 4.12), the first being automatically displayed when the user chooses the ‘Find’ or ‘Browse’ command. The other menu lists more complicated searches available. Each search type is allocated a letter and it is this letter that is typed into the keyboard to commence the search.

The Socrates system collects its information into a series of ‘headings’ and it is in this way that the search results are presented. These headings are divided into topics, titles, authors, and corporate names. Importantly, each heading does not correspond to one item rather, each heading has a number of items listed after it and these items are all given an individual citation number, it is these citation numbers that correspond to items.

It is possible to limit searches to particular forms of material these are known as citation files these are: books, films, scores, computer files, recordings and archives. However, Stanford does not recommend limiting searching to particular files, as historically some items have been catalogued in areas not expected, i.e. atlases with books not maps.

This system has two main methods of searching through the citation files: using the ‘find’ command, or through the ‘browse’ function, which gives the user a series of topic headings.

**Searches**

In order to explore the system the following searches were completed:

a. Subject search (S) - Russian Drama.

b. Library of congress subject headings (LCSH) - Russian Drama.

c. Browse Author search (Browse A) - Shakespeare.

d. Author search (Find A) - Shakespeare, William
a. This search produced 119 headings (Fig. 4.13). Both search words appeared together in the search result headings. Selecting 'D' for display or 'DF' to display a full result plus a heading number, produces bibliographic details about an item (Fig. 4.14). Brief citation results gives the user the author, title, publisher, dates and location and classmark. The full display gives some cataloguing details plus notes and topic headings. The search term would be present in the title of the item found or in the topics listed in the bibliographic records for that item.

b. This search functioned by using a formal selection of headings by the Library of Congress. The search could only really be used if the user was familiar enough with the library of congress headings to know if the search term would be represented. Russian Drama is a library of congress subject heading, and produced 101 results in the form of headings. These headings were all topics for example:
Topic: Russian Drama- Finland- History- Criticism-(1 Book).
As this was a large result at the top of the screen the words 'HELP LARGE RESULT' appeared so the user could learn how to limit or refine her/his search.

c. This as a 'browse' search required the user to type 'browse' to return to the basic search menu. This search produced a list of authors names, after browsing these it was realised that the following author (number nine on the screen) was the one required:

9) Author: Shakespeare, William (1564-1616),
(2101 books, 89 films, 90 scores, 110 recordings, 2 computer files)
The display screen told us that there were 2392 citations.
d. The author search for William Shakespeare produced two headings, the second being the author required and gave the same number of citations as search number 3. The system still recognised the name and produced the same search result regardless of the way the name was typed into the computer, i.e. surname first or christian name first.

*Information given*

The information presented is very extensive and also easy to manage through the dual level of display feature.

**4.3.4 Navigation**

The Stanford system uses a series of screens to display information. This information display is achieved by the user typing in a series of commands which appear at the foot of the screen. There is however no 'previous screen' prompt for the user to use if he/she becomes confused. The user can view previous citations by using the 'scan' button or use the 'menu' prompt to go back to the search menu. The user must also go back to the menu after each search type, even though the commands can be easily remembered and the user may not need to be reminded of the search commands.

The use of citations instead of items can become very confusing, especially if a heading has many citations, as in the Shakespeare search (Search c). This had some 2392 citations, but the appropriate heading number was 9. A user may wish to view citation number 2000, this must be typed as DF 9.2000. This may be easy to remember if only one citation is required, however if a user then requires another citation under the same heading, i.e. number 2222 the user may type 2222 without the 9 as we are already using heading number 9. However, it is necessary to type the heading number again as well as the citation number, regardless of the heading being used.
Help
These were very detailed and provided useful information, the help command was also available at the bottom of every screen.

4.4 Stanford University - Web

4.4.1 Web Access: http://www-sul.Stanford.edu/
Web access is achieved via the above URL.

4.4.2 Interface
DB-Connect is an experimental formbase catalogue containing over 3.2 million records which is roughly equivalent to 99% of the Stanford catalogue. The user interacts with the interface by typing in search terms, and using the mouse to select information.

Menu
This interface offers a form to fill in, there are boxes for author search, title search, organisation search and number search. The user types a term into a box and uses the computer mouse to 'click' on the 'start search' box.

Commands
In this system the 'forms' style of interface is presented where the user types in the boxes as required and begins the search by using the mouse to click on the box with the command 'send query', the search can be cleared in the same way. The user can alter or limit the search by using the boxes with Boolean operators 'and/or' printed in them. These occur between every search term box. The user also decides the maximum number of results to be retrieved, so the user can customise the search to suit her/his own needs (Fig. 4.15 & 4.16).
DB Connect Socrates

Socrates is the computerized catalog of the Libraries of Stanford University. Socrates contains citations for most (but not all) items in the Stanford Libraries, including items on order, and items received but not yet cataloged. As of July 1993, Socrates includes more than 1.2 million citations, covering approximately 99% of the libraries' collections.

When you search Socrates, you are searching in a large catalog where information about different types of library materials is combined.

There are 3 "citation files" that contribute information to Socrates: Books, Maps, Serials (periodicals, newspapers), Films (video, audio/video), Scores (i.e. musical scores), Computer Files, Recorded sound (recordings), Autographs (manuscripts).

Enter appropriate search terms in the boxes below.

Database to Query: Socrates (all)

Title:

And: [Author]
And: [Subject]
And: [Organization]
And: [Number]

Send Query: Clear Query: Start: 1 Display: 25

This is an experimental service accessing Stanford's Foresythe System.

239-50 at Stanford

Fig. 4.15

Fig. 4.16
Layout/Graphics

This system uses a form layout for the search input section, and a mix of graphics, colour and differing fonts to display results making information easily read. Each record number is printed in blue to stand out from the bibliographic details. Each record is also given an icon signifying the form of material. Any aspects of the display that are printed in blue can be 'clicked' on and further information provided. Item availability is printed at the end of each record, and the words 'HELP STATUS' are printed on the initial record if there is a problem gaining access to the item.

4.4.3 Search Points

The interface for DB-connect is very different from the command based form of the telnet system. The web form allows the user to modify his/her search at will. The following searches were used to explore this interface:

a. Subject search - Russian Drama.

b. Author - Shakespeare.

c. Author - Shakespeare, William.

Results are produced as a series of items, there are no headings produced, even when an author search takes place. When an author search takes place on DB-connect, rather than a two stepped search taking place (firstly a numbered list of authors with similar names is produced for the user to chose from, secondly, the system then searches on the name chosen), items written by all authors with the same or similar names are displayed.

a. This search yielded 385 items rather than topics or headings. The form of material (book, etc) was clearly indicated by the use of an icon at the beginning of each record. The number of items found was indicated at the beginning of the display, but not the number of each type of material.
Each item that was produced gave the user a brief record of the item including author, title, publisher, and location (Fig. 4.17).

The results were easily read, each item given a record number in blue which could be clicked on by the mouse for further information. Each item either contained the search term in the title or the subject fields shown in the full record. Each full record gave topics in blue which could clicked on to give related searches (Fig. 4.18).

b. This search produced 2410 records, but produced results by authors other than the one required.
c. This produced 2396 records all by the author required. This author search would not accept the search term William Shakespeare, producing no records. This system then requires names to be inputted in a particular way.

The maximum number of records that could be retrieved at one time was 75, the user could then click on the words 'more records' for the system to produce more. The user can also limit her/his search at this stage. There is also the facility for the user to comment on the system by electronic mail, the user could also access the MARC record of any item.

4.4.4 Navigation

This system did not use a series of screens but relied on the user scrolling information by using the computer mouse. The click and point system made the interface easy to navigate, as did the use of graphics and different fonts.
There was no 'home' icon to return the user to the main menu.

Help

There were no help pages on this system these would have been helpful when planning searches. However it should be noted that the titles of the search types in this system are easily understood so require little explanation.

4.5 Monash University - Telnet

4.5.1 Telnet Access: Library.Monash.edu.au

The online catalogue at Monash university is called Sesame 2, it is accessed via telnet with the above code using PALS software. There is no password required to access the catalogue.

4.5.2 Interface

Menu / Commands

This interface presents the user with a menu containing a number of search options which can be accessed by using a series of commands. Many of these commands consisted of two letter code derived from the beginning of the command word, which made them easier to remember. However these commands were not repeated, the user was expected to remember them although it was possible to return to the menu. The command prompt were the words 'catalogue mouse' and an arrow (Fig. 4.19).

Layout / Display

The screen layout consisted of lines of typed information which could be scrolled. The layout of information was at times confusing with very little space between areas of the screen used for different functions, i.e. no space between the screen heading and the screen display. Useful commands instead of being apart from a display so easily read, merely ran on from the
display results. The location of books and some commands were typed in red, but the fonts were the same. No graphics were used and some displays looked cluttered.

![Terminal - library.monash.edu.au](image)

**Fig. 4.19**

### 4.5.3 Search Points

The Monash system did give the user a good range of search terms although the user was expected to type commands into the system after the prompt, which was not clear at first as the words ‘catalogue mouse’ do not indicate an obvious response for the user. The following searches were used to explore the service.

a. **TE (Keyword)** - Russian and Plays.

b. **BR AU (browse author)** - Shakespeare.

c. **Au (author)** - Shakespeare, W.

a. The letters TE were typed into the computer then the words ‘Russian and plays’. If the user waits a few seconds before typing in the search term, the
system will give the user a series of help screens, while intending to be useful this can be annoying as the user must wait until the full help pages have run before continuing.

When the search has been typed in the system firstly tells the user, the number of items for the first term i.e. Russian = 4831, then the number of items for the whole term i.e. Russian and plays = 25.

b. Browse author Shakespeare first gave the user a list of 20 authors. A slightly confusing point was the display of the author name, which was truncated to Shakespear as the field for the author was only 10 characters. The results were 666 records for Shakespear, William and 253 for Shakespear, W (Fig. 4.22).

The term 'DI' is used to display, each record has a four numbered code which tells the user: the date of publication, the title, the author. The records are all displayed alphabetically by title. Record numbers can be further expanded, giving the user the author, title, publisher, description, series, notation, and subject fields (Fig. 4.21).

c. Au Shakespeare gave 944 records shows that the system is flexible.

Information given
The entries on this system did give cataloguing notes, but showed some irregularities for example the works of the playwright William Shakespeare were catalogued in two separate entries depending on which university library they were in.
4.5.4 Navigation

The layout of this system made it confusing at times and difficult to navigate. Commands were only shown once, and not frequently repeated. There was a previous screen key, which was useful.

Help

The help facility was useful but very long.

4.6 Monash University - Web

4.6.1 Web Access: http://www.monash.edu.au

Web access is achieved via the above URL.

4.6.2 Interface

This interface allows the user not only to make choices about the type of search taking place (Fig. 4.22) but also, to choose such factors as the published date of material to be recalled. The user can also choose the number of records to be retrieved and which of the university libraries, are to be searched.

Menu / Commands

This system does not require the user to consult menu codes to begin a search, but the user is confronted with a series of quite difficult search terms, (the same as telnet) without a help page.

Display

The display was clear and easily followed, the system used italics and icons to help user understanding and gave an email address for comments.
4.6.3 Search Points

There were a multitude of different search types available:

- Keywords [TE], Title keywords [Ti], Exact Title [Ti], Author keywords [Au],
- Corporate Author [At], Subject keywords [ST], Exact Subject [Su], Author and
- Title [CO], Call No [CA], Reserve search [Res], Serials search. Many of these
- search terms are very difficult to understand but there is no help. This system
- also gives the choice of limiting the search at the time of input.

The system was explored using the following searches:

a. TE (keyword) - Russian and Plays.
b. SU (exact subject) - Russian Drama.
c. Au (Author keyword) - Shakespeare.
d. Au (author keyword) - Shakespeare, W.
e. Au (author keyword) - Shakespeare, William.
a. This search produced a series of 25 results, the screen did not tell the user the number of items retrieved rather the user had to add up the number of results manually. Both words in the search term appeared in the subject fields or the titles of the items found. Initially the record produced for each item consisted of a record number, the publication year, the title of the item and the author of the item (Fig. 4.23 & 4.24).

If the user wished to gain further information this could be obtained by using the mouse to click on the blue record number. The record so produced would be a fuller record giving cataloguing details, author dates and a series of topics. Both the author dates and the topics could be used to commence related searches (Fig. 4.25 & 4.26).

b. This subject search for Russian Drama produced 43 results.

c. The author keyword search rather than producing a series of indexes containing author names for the user to chose from, produced all the items in its database by Shakespeare not all by the author that we were interested in. 943 items.

d. The author search Shakespeare, W, also produced a series of results not all useful.

e. Shakespeare, William did produce 665 results all relevant so it does prove it is worth putting the right name into the computer.
### Fig. 4.23

#### Keyword Search Results for Russian Plays

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chekhov's great plays: an critical anthology</td>
<td>Antsov</td>
</tr>
<tr>
<td>Chekhov in performances in Russia and Soviet F.</td>
<td>Sukow, E.</td>
</tr>
<tr>
<td>The demantibist play</td>
<td>Khlebnikov, Vasily</td>
</tr>
<tr>
<td>FIVE RUSSIAN PLAYS, WITH ONE FROM THE UKRAINE</td>
<td></td>
</tr>
<tr>
<td>Four Russian Plays, Popovian: The first act</td>
<td></td>
</tr>
<tr>
<td>FOUR RUSSIAN PLAYS, BONYGIN, GRIBOEDOV</td>
<td></td>
</tr>
<tr>
<td>The Golden age of Soviet theatre.</td>
<td></td>
</tr>
<tr>
<td>Left-wing dramatic theory in the American theatre</td>
<td>Levine, Ira A.</td>
</tr>
<tr>
<td>The love god and the innocent</td>
<td>Solzhenitsyn, Alexei</td>
</tr>
<tr>
<td>Plays /</td>
<td>Chukhov, Anton Pavlo</td>
</tr>
<tr>
<td>Russian satire comedy: six plays /</td>
<td></td>
</tr>
</tbody>
</table>

### Fig. 4.24

#### Keyword Search Results

You can narrow your search by entering more search terms in the text box below, by limiting the publishing date of the book or by selecting a certain library.

- **Search terms**: Russian Plays
- **Limiting date**: After, Before, Equal
- **Limiting library**: All
- **Maximum results**: 50, 4

56
4.6.4 Navigation

The Monash system was very easy to navigate, the screen scrolled so information could be easily retrieved. There was also a return to search icon if the user becomes lost.

Help

The system did not provide any help pages which was a problem especially with the difficult terms used and the many functions of the interface.

4.7 Final Comments-Telnet

4.7.1 Interface

Menu / Commands

Monash and Stanford use a few large menus from which the user can choose a series of search types or functions. The Loughborough system is perhaps the most user friendly, with a series of small more specialised menus, having options that are selected not by commands but by using the arrow keys on the keyboard, the return key being the means of activating a search. There are a few simple commands in the Loughborough system but these are repeated on the bottom of every screen. The user need not remember any commands and only needs to type in the search term.

Monash and Stanford use a series of command codes that correspond to searches or screen displays, these must all be typed into the system along with the search term.

Graphics / Layout

The three telnet systems used a simple type with no graphics. Loughborough and Monash did use a red type face to highlight certain commands. The screen layout for Stanford was divided according to function with the top of
the screen used for the search title and number of items, the middle of the screen for the display, and the bottom of the screen for commands. This made the screen easily read and uncluttered. The Loughborough screen was similarly organised but employed a system of stacking screens, which were often poorly defined, this could be confusing at times.

The Sesame 2 system at Monash did not divide screens according to function, there was very little space between search titles and results and this could be confusing, and the screen often looked cluttered.

4.7.2 Search Points

Each university used their own variety of search types, Stanford employing the largest number with many specialised searches. All three had a browse facility useful to refine searches, perhaps Stanford has the most specialised of these which encourages the user to browse headings and topics.

Author searches in all three would involve a two step search, firstly the system producing a number of authors and their dates, for the user to choose from, the system then searching under the chosen author.

Information given

Stanford and Monash University both had two levels of result display. The first the initial item display gave the user the author, title, publication dates, and location of the item. A more detailed display could be seen which gave some cataloguing details and further notes and, in the case of Stanford subject fields. The Stanford system of citations and headings could be difficult to follow.

The Loughborough system also gave two levels of display, the second level intended to give the user greater information in most cases only gave the user
4.7.3 Navigation
Loughborough was perhaps the easiest to navigate as the menus were small and the commands were simple and few in number. However, a detailed record of an item could be confusing. Monash was the most difficult system to navigate as the screen scrolled its information and the cluttered screens were at times difficult to read.

4.8 Final Comments- Web Interface

4.8.1 Interface
Menu / Commands
All three web interfaces allowed the user to use the computer mouse to 'point and click' on areas of the screen to make information selections. This meant that the web interfaces did not use commands, and in consequence were easier to use. Loughborough used the same searches as were present on the telnet system, these were presented as a series of buttons for the user to select. Each search chosen had its own separate screen as the telnet system. Monash also kept the same number of search titles, these were difficult terms and the system did not provide much information to help the users choice.

Stanford by contrast, limited its search titles to author, title, subject, organisation and number. However Boolean operators have been added to help the user to limit or widen their search.
Graphics / Layout

The three interfaces all employed graphics, colours and various fonts to help understanding. All used blue type to indicate areas that could be explored further.

Stanford Universities DB-Connect has the most radical layout, as a form to be filled in by the user. The user can decide to combine search types, chose how many items are retrieved, and which library is to be searched. This system also allows the user to specify the form of material to be searched i.e. maps.

The Monash system has a layout similar to DB-Connect but uses the same searches in its web system as in its telnet system, therefore the user must still use those searches. However, the user can limit certain variables on input such as the publication date of the items retrieved, and the number of items retrieved. The Stanford's DB-Connect displays a much smaller number of search types than its Telnet system limiting them to Author, title, subject, organisation and number. However this smaller number of search types is used with a much greater flexibility for the user, as there are a large number of ways for the user to modify the search.

The Loughborough interface is not of the 'form' type only allowing small search modification by the user, the searches available are the same as are available on Loughborough's telnet system.

4.8.2 Search Points

All three systems display their results as a series of numbered items. The Stanford system uses a number of icons so the user can tell the form of the item at a glance. The Monash system uses a form of grid to display items, but
some item details do not fit!. The Monash system also fails to tell the user how many items have been retrieved before displaying them, this means that some users will have to wait to receive all the records before deciding the usefulness of the search.

All three systems have two levels of display. The Stanford and Monash systems produce subject fields or subject strings for each item, these can be 'clicked' on, and the system will search for other items in the library containing the same subject fields. This then can be useful to the researcher to find further information about her/his subject of interest. Stanford also allows the user to 'click' on the author name and then produces a list of items in the library by that author. All three systems have a 'related search' function.

Author searching is done in one stage on all web systems, instead of producing a list of similar authors for the user to choose from, the systems search and produce a list of items by authors with the same or similar names which may not all be relevant. The 'browse' facility is only present on the Loughborough web, the other two have discontinued this function.

Stanford also allows the user access to the 'notis' details and the MARC record of every item. All three allow the user to EMAIL the librarian with comments or questions about the system.

4.8.3 Navigation

All three systems are very easy to navigate, as the mouse makes interaction easier than with the keyboard. The Monash and Loughborough system both repeat a series of options which allow the user to return to the search screen. All systems use icons rather than commands to help understanding.
Help

Help pages on the web systems are much less detailed, but the systems are very user friendly. It was noticed that there was very little explanation of search terms which could be very difficult to understand, this was especially the case with the system at Monash, where there are a large number of search options with very little explanation.
Chapter 5. Conclusion

In this dissertation the impact of the Z39.50 protocol on library catalogues has been explored. In some quarters this protocol is seen as a contribution to the presentation of library catalogues, with the ability to change many aspects of information searching and retrieval.

As database companies realise the value of implementing Z39.50, multiple groups of databases will be available to the user through only one interface. This benefits the company as the user friendliness of using only one interface, encourages use, the user will in turn gain a simpler system of searching. This is also a benefit to the information professionals who need to understand databases quickly and thoroughly in order to teach others.

For many libraries the idea of a distributed library system is a positive ideal allowing data and services provided from different places seeming to the user as a single system (1). Chapter 2 describes many of the European projects currently in operation to provide distributed systems.

The protocol also brings the possibility of cheaper and faster Electronic document delivery, as shown in the DALI project.

Perhaps the most exciting benefit for the user from the Z39.50 protocol is the ability to search small groups of libraries simultaneously, the user is then provided with a single results list. This in theory would make searching much quicker as the user would not need to enter separate searches. The IRIS system (chapter 2) is aiming for this. In chapter 2 Michigan’s ZWeb is explored as the user is able to create small groups of libraries in a certain
area, and choose a library from this.

All of these ideas bring the possibility of resource sharing and the possibility of a virtual library closer.

But is this protocol really an evolution? Certainly Z39.50 has brought a change in the presentation of information, as is seen clearly when information on the telnet system is compared with the information on the new web access catalogues. After comparing the two platforms in three universities the major differences between them can be categorised as follows:

- **User Friendliness.** The graphical user interface in the new web systems is very easy to use. There are no complex commands to learn as in telnet, the user can 'click' and point on the link required. The use of graphics and colours also make the web sites pleasant to use and help the user navigate around the system.

- **Flexibility.** Web site catalogues often give the user a large number of choices when inputting searches, Boolean operators may be used to help limit or widen searches, as well as lists of dates and library sites to choose. All these choices give the user the chance to tailor her/his search to individual needs.

- **Searches.** The web sites often have a smaller number of more general searches, telnet systems may not have the flexibility in input but do have a larger number of specific searches, so flexibility in search type is gained.
The user friendly design of the web catalogues along with their interactive nature, makes the presentation of their information pleasing to the eye, but the content of the web catalogues is also important. In order to explore the major issues involved with the integration of the Z39.50 protocol in library catalogues, three universities libraries all with their own style of web catalogues were examined. The catalogues chosen were: Loughborough University, England., Monash University, Australia., and Stanford University, U.S.A.

The library catalogue at Loughborough University's web site presents the user with a user friendly interface but few changes in terms of the information given from the older telnet system. All searches available on Talisweb are also available on the telnet system.

The similarity between the two systems at Loughborough is mirrored in the search results, for example the 'Author Search' for 'Shakespeare' produced a list of 1326 items on both telnet and Talisweb. The amount of information about each item is also the same. This would suggest that both systems are searching and retrieving information from the same database.

Both systems allow the user to alter a search before its input, and also offer the ability to narrow a search. However, there is no facility on the web system to limit searches by publishing date. There is the opportunity to comment on services through an Email link, encouraging interaction with the library.

Although the web system has not brought any obvious benefits in terms of amount of information provided, the web catalogue is very user friendly and highly interactive, providing links to other web sites as well as further
information about the catalogue.

Although Loughborough University has introduced a web access, in many aspects its system has changed very little. The user interface has search point buttons embedded in the interface in a similar way to the menu of searches available to the telnet user. When a search is chosen on the web page a new screen appears which is individual to the search type i.e. Author. This again is the same format as the telnet OPAC.

The catalogue web site at Monash University has also maintained the searches of its telnet system, but there have been many changes made to both the user interface and the information presentation. When the user accesses the Monash web catalogue they will find the interface is different to the old telnet system in many ways. Instead of the search choices presented as buttons on the screen, there is a scrolled menu to choose from.

The interface brings added flexibility to the search, with a movement towards a form style interface enabling the user to fill in boxes to vary the information retrieved by date of publication, library to be searched or the number of results to be retrieved.

Detailed information about an item could be found by 'clicking' on a result, and lists of related topics that are produced can be 'clicked' on and further related searches are then commenced.

The Monash system also shows no differences in terms of number of results between the telnet and web systems.
The Monash system has introduced a large amount of flexibility into its web access catalogue whilst retaining the specific searches. In this way the user gains the benefits of a user friendly interface with flexible searches without losing the specific nature of the telnet system.

The Stanford University web site has used the Z39.50 protocol to radically transform its presentation of the library catalogue. The user interface is presented as a 'Form' which the user fills in to commence a search. Perhaps the most radical aspect of web site is the choice of searches, instead of the large number of specific searches a few, very general searches remain.

The large number of searches available in the telnet system mean for the user who requires a specific search i.e. Library of Congress subject headings, would find the telnet system exactly what is required whereas the very general searches in the web system may mean that a user would take longer to find exactly what he/she requires.

The general nature of the searches are in part compensated for by the large amount of flexibility built into the interface, Boolean operators are used between each search type so a search can be limited or widened. The search can also be limited by library (you can choose the specific one on campus to be searched), and publication date of material.

It is impossible to compare in detail the results of DB-Connect (Stanford’s web catalogue) with Stanford’s telnet system, as the telnet system employs a different way of presenting results. The searches that were performed did produce a large number of results, but this would be expected with the general nature of the search types.
From this it can be seen that the changes are not all positive. Users that have the time and the inclination may find that search wise, they are better served by using the telnet system with the highly specific searches.

Whether the introduction of the Z39.50 interface is seen as positive or negative, it is certainly the way of the future, the popularity of the internet has meant that many people are used to using a form filling interface as it is the standard way to search many of the large search engines. It would make sense for libraries to adopt this form filling pattern. Catalogues should maintain a standard interface to avoid marginalisation of individual library catalogues and subsequent neglect by the public.
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