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Acronyms and abbreviations

AMED	Allied and Alternative Medicine
CAST	Centre for Applied Special Technology
CHSL	Community Health South London NHS Trust
CHI	Commission for Health Improvement
DTD	document type definition
LIS	Local Implementation Strategy
IfH	Information for Health
IEEE	Institute of Electrical and Electronic Engineering
MCQs	multiple choice questions
NeLH	National Electronic Library for Health
NHS Executive IPU	NHS Executive Information Policy Unit
NICE	National Institute for Clinical Excellence
NIST	National Institute for Science and Technology
OPAC	online public access catalogue
SLAM	South London and Maudsley NHS Trust
STELLA	South Thames ELectronic Library initiative
STLIS	South Thames Library and Information Service
VIVOS	The Value and Impact of Virtual Outreach Services

Library web sites

Bloomsbury Healthcare	http://www.bhlib.demon.co.uk/servic.html
Brighton Healthcare	http://www.brighton-healthcare.nhs.uk/library/default.htm
British Library	http://www.bl.uk
Brunel University	http://www.brunel.ac.uk
Central Middlesex Hospital	http://www.cmhlib.demon.co.uk/index.htm
Chichester Health Libraries	http://stlis.thenhs.com/sthames/stlis/cr.htm
Exeter Medical Library	http://www.ex.ac.uk/library/eml/welcome.html
Glenfield Hospital	http://www.glenlib.demon.ac.uk/
Goldsmith's College	http://www.goldsmiths.ac.uk
Institute of Psychiatry	http://www.iop.kcl.ac.uk
King's College London	http://www.kcl.ac.uk
National Library of Medicine	http://www.nlm.nih.gov
South London and Maudsley	http://slamlibrary.xiy.net
South Thames Libraries	http://stlis.thenhs.com/sthames/stlis/index.htm
University College London	http://www.ucl.ac.uk
University of Greenwich	http://www.gre.ac.uk
University of York	http://www.york.ac.uk

Other web sites

British Medical Association	http://www.bma.org.uk
BMJ	http://www.bmj.com
Center for Disease Control	http://www.cdc.org
Center for Applied Special Technology	http://www.cast.org
Department of Health	http://www.doh.gov.uk
Doctors.net	http://www.doctors.net/.
eXTReMe Tracker	http://www.extreme-dm.com/tracking/
Health on the Net Foundation	http://www.hon.ch
FreeFind	http://www.freefind.com
IBM usability pages	http://www-3.ibm.comibm/easy/eou_ext.nsf/EasyPrint/601
MEDLINE	http://www.pubmed.gov
National Institute for Science and Technology	http://www.nist.org
Nursing Standard	http://www.nursing-standard.co.uk
Online Mendelian Inheritance in Man	http:// www.ncbi.nlm.nih.gov/Omim/
National Institute for Clinical Excellence	http://www.nice.org.uk
Physicians Online	http://www.mydoctor.com
Royal College of Psychiatrists	http://www.rcpsych.ac.uk
Royal College of Nursing	http://www.rcn.org.uk
Sainsbury Centre for Mental Health	http://www.scmh.org.uk/
SitePoint	http://www.sitepoint.com
ukpractice	http://www.ukpractice.net/
Usability.gov	http://www.usability.gov/guidelines/
UserDesign.com	http://www.userdesign.com/
Virtual Hospital	http://www.vh.org/
Web Design Group	http://www.htmlhelp.com/
Web Developer's Virtual Library	http://www.wdvl.com
Webword.com	http://www.webword.com
Webreview.com	http://www.webreview.com
World Wide Web Consortium	http://www.w3.org
Web Design Group	http://www.htmlhelp.com/

Abstract

A usability evaluation was carried out of the recently-launched South London and Maudsley NHS Trust library web site using a variety of standard methodologies: content and design evaluation of selected comparable sites, focus groups, a questionnaire survey of library and web development staff, heuristic evaluation, observation testing, card sorting/cluster analysis, and label intuitiveness/category membership testing. All test participants were staff of or providers of services to the trust. Demographic information was recorded for each participant. Unsuccessful attempts were made to evaluate user feedback, and to compare usability test results with usage statistics.

Test participants' overall responses to the site were enthusiastic and favourable, indicating the scope and content of the site to be broadly appropriate to the user group. Numerous suggestions for new content areas were made by testers. Usability problems were discovered in two main areas: in the organisation of the site, and in the terminology used to refer to information services and sources. On the basis of test results, proposals for a revised menu structure, improved accessibility, and changes to the terminology used within the site are presented.

**Usability evaluation of the South London and Maudsley
NHS Trust Library web site:** http://slamlibrary.xiy.net

I.   *Introduction/background*
I.1)   *The South London and Maudsley NHS Trust*

I have recently built and publicised a web site for my library, the South London and Maudsley NHS Trust (SLAM) Multidisciplinary Library in Stockwell, London SW9. The South London and Maudsley Trust is a large, geographically dispersed organisation covering four London boroughs (Lambeth, Southwark, Lewisham and Croydon), with over 4500 staff based at at more than a hundred sites. I have been in post as the manager of this library service for nearly six years; I maintain extensive personal contact with the readers via user education and support, carrying out literature searches, etc. It is not the only library serving the trust; staff also have access to all the King's College libraries and to the Lewisham Hospital library; however it is the only library directly managed by it, and hence has a pivotal role in the provision of and coordination of information services. The staff it serves vary widely in educational level, in professional background, and in information and computer literacy.

There is a trust intranet, which holds a great deal of basic information regarding the organisation and its policies; all clinical teams have access to this. The library has a very limited presence on it at present. Significantly, Web connectivity within the trust is very poor--only about 120 PCs currently have access to the NHSnet—therefore most staff have to depend on access externally: at home, or via NHS, academic or local authority libraries. The library also provides a service to the local community health trust, Community Health South London NHS Trust (CHSL), in which Web connectivity is much better, with most clinical teams having access at their team bases. Mental health and social services are now fully integrated within the borough of Lambeth, and the library is contracted to provide an information service to the staff of Lambeth Social Services. Here, while most staff have access to email, Web connectivity is almost non-existent.

I.2)   *The STELLA initiative*

The library until recently was part of a consortium of NHS libraries, South Thames Libraries (STLIS). In early 1998 STLIS adopted an overarching electronic information strategy, known as STELLA, the principal aims of which were:
- to deliver to health care staff electronically, at their workplace, the full range of services and resources they were receiving in print and paper form via their local NHS libraries
- to deliver new information resources hitherto unavailable because of the limitations of print and/or CD-ROM
- to treat the knowledge resources of the region as a single resource accessible to all irrespective of location, affiliation or profession.
  (South Thames Libraries 1998)

In terms of its content, the objectives were both to enhance access to existing library services and to extend and improve their electronic content, through, e.g., the enhancement of access to e-journals and bibliographic databases via consortium purchasing schemes, and the publishing of the Regional union catalogues on the web. The development of a STLIS web site, *incorporating "satellite" sites for each of the local libraries*, was seen as central to these objectives.

For library users, the site was intended to:
- provide them with improved contact with their library
- give details of information resources available to them
- provide a gateway to the increasing quantity of health-related material on the web
- offer online information and help, e.g. subject guides, online tutorials, current awareness bulletins, briefings on current NHS issues
- provide news of new developments in electronic information
- reduce the cost of accessing library services, especially for community and primary care staff
- publicise library services

The local library web sites were initially little more than single pages, providing contact and resource information within a standardised format.

In September 1998, the Department of Health published its information strategy for the National Health Service, *Information for Health* (IfH) (DoH 1998). Much of this related to the management of patient-identifiable information; however, significant coverage was given to information and library services, and it was proposed to set up a National Electronic Library for Health (NeLH) to support existing library services. IfH required each health authority to produce a full Local Implementation Strategy (LIS) for IfH targets and objectives. Official guidance on the scope and content of LISs, which was published in 1999, included the so-called Annex M which covered "library services and access to evidence" (NHS Executive IPU, 1999). STELLA then effectively amalgamated with LIS; librarians became involved with local implementation groups in their areas and were able, within varying degrees to pursue a library agenda within them. The provision of clinician desktop access to sources of information on evidence-based practice was included as a key objective of the local LIS (Lambeth, Southwark and Lewisham Health Authority, 2000).

The staff of the Regional Library Unit at South Thames Libraries envisaged initially that the consortium web site would be used extensively as a gateway to information by health professionals, as well as providing a resource for library staff. Activity statistics are not available from the site host; however, it has become apparent from informal observation within the libraries that, other than as a means of accessing the union catalogue, users seemed to have little interest in it; the site is being used exclusively by library staff themselves. As time went on it proved impossible, due to staffing difficulties, for currency to be maintained across some of its key content areas. Overall, the site was evidently not fulfilling its purposes as originally intended.
This was one of the factors leading me to consider the desirability of putting together a more-than-vestigial web site for my own library.

I.3)   Health professionals' access to and use of the web

There is by now a large body of professional literature in the mental health, community health and social welfare fields relating to web-based resources and their importance for the development of evidence-based practice. In psychiatry, these include: Bremer and Beresein 2000; Huang and Alessi 1996; Huang and Alessi 1999, Kotak and Butler 2001, Kramer and Kennedy 1998, Lim 1996, Senior et al. 1997; in psychotherapy: Tantam 2001, Laszig 2000; in nursing: Fleck and Levy 1999, Ribbons 1998, Ward and Haines 1998; in psychology: Barak 1999; in social work: Holden et al. 2000. In accordance with current e-government strategy, the Department of Health and other statutory bodies use the Web extensively as a vehicle for official communications. There are also several journals devoted to health informatics and to health information on the Internet. One would expect all clinical staff, therefore, to have some awareness of the web and its potential uses for locating information of professional relevance (cf. Appendix 2).

However, a web site can obviously only be useful insofar as access to it is available. Anecdotal evidence (conversations between library staff and readers) suggests that many staff (estimated >50% and increasing steadily) have Internet access at home. One frequently discovers, however, particularly with staff at lower grades, that they have made little use of it, and have no idea how to conduct a Web search; one reader reported to me asking her daughter to carry out searches for her on a regular basis! It can be useful also only insofar as it fits with and relates to existing patterns of information seeking and use among its intended users; appropriate training and support also needs to be provided to them in respect of information sources and services (cf. Yeoman et al. 2001).

While Web access among the group of test participants was surveyed (see below, Table 9), it did not prove feasible to carry out a detailed survey of Web access and use among members of the library or among staff of the local NHS trusts generally; one has to assume, therefore, that the local situation is reasonably typical of findings elsewhere. A number of surveys have been undertaken in recent years, worldwide, across the UK and locally, on access to and use of the Internet by health professionals (see Appendix 1) These have focused largely on doctors or on nurses; there is little information available for other health professions. There have also been a number of significant studies of information needs and use within health professions in relation to the web (Appendix 2).

The NHS is now under instruction that 25% of clinicians should must have browser access to NHSnet and the Internet by 31 March 2001; by March 2002 this should be 100%. (NHS Executive Information Policy Unit, 2001, page 39). Accordingly, access to the Web will then be universal within the NHS. It remains to be seen whether this target will be achieved. I am informed by the director of information management and technology that, within SLAM, the position will depends on the outcome of a number of current bids for funding to improve network infrastructure; the figure could be as low as 10% by March 2002.

I.4) The library web site: origins and rationale

Palmer, in her study of information for community mental health workers (Palmer 1999), suggested the development of "signposts" to information as a method of improving awareness and use of information resources. A signpost, she says, should aim to function as:

- a guide to the availability of sources and services of learning resource, library and information providers
- a way to inform people of their rights to access to these sources and services
- a channel through which users could be directed to the appropriate initial point of access to resources
- a device to educate and develop users as independent learning resource users.

I envisaged that a full-scale library web site might be able to function as sort of "electronic signpost" in this way, and to address a number of problems in the existing provision of information services, by:

- publicising the library and its services beyond its historical user base and immediate geographical catchment area (Lambeth and North Southwark);
- providing considerably enhanced access to library services and other electronic sources from home for staff who are geographically isolated and who have difficulty accessing conventional library services during their working day;
- providing a window to selected, quality-filtered information geared to the specific needs and interests of practitioners working in mental health, and in community and primary care, which is not available on the STLIS web site;
- offering an effective, customised means of access to the large variety of electronic journals which the library provides;
- making available internal resources and products, such as bibliographies and search guides (cf. Diaz 1998, Stover 1997).

No formal methodology was employed in the initial design of the SLAM library site, which was based largely on intuition and first-hand knowledge of the intended user group, with some reference to the web sites of similar libraries. I used Microsoft FrontPage 2000 as my main HTML editor, as the trust had standardised on this; Hester (1999) was my main source on its use. (This subsequently proved problematic, both in terms of the accessibility evaluation (IV.5)--due to the non-standard nature of Microsoft HTML (Christiansen 2000)--and of the site's functionality. Initially I used the FrontPage forms template and site search; when I discovered that the STLIS web host did not support Microsoft Extensions, I was obliged to use externally-hosted services.) drew some of the content from existing material, such as guides to services, forms, new book announcements, and lists of web-based resources; the remainder was created *de novo* (see Appendix 3).

According to Fowler (1998) "usability is the degree to which a user can successfully learn and use a product to achieve a goal." It is often assessed in terms of a range of aspects: *ease of learning, retention of learning over time, speed of task completion, error rate,* and *subjective user satisfaction* (Levi and Conrad 1998).

A web designer aims to create a site that is *useful* (enables users to achieve their particular ends and meets their needs), *easy to use* (enables users move around the site rapidly and with few errors), *visually attractive*, and *popular* (Veldof 1999). A site should be *user-centred* in that it is based on knowledge of the site's users, in particular their technological and physical capacities, their cultural context, and their information needs (Monash 2001).

Library web sites are complex applications "integrating access to and interaction with a diverse set of information products and services and with people" (McGillis and Toms 2001). These would seem to be truisms, yet the extant studies of the development, evaluation and subsequent revision of library web sites suggest that major problems of usability are often encountered, requiring radical restructuring of the site. Some of the sites documented in the literature have undergone an iterative design process involving prototyping, usability testing and rebuilding, analogous to that of other major software projects. Normally, usability testing would be carried out during the development of a web site as well as after it. However, it seemed appropriate, with an initial version of the site live and available, to use the opportunity presented by the M.Sc. project to carry out some usability testing as a means of evaluating the appropriateness of its design and content, and establishing what modifications might be necessary.

Matylonek (1999) identifies four typical sources of bias for the creators of web sites:
- discipline jargon---professional terminology not understood by users
- hierarchical bias---confusion of the organisation's structure with customer services
- expert proficiency: design of layout that presumes comfort in a web environment
- "folk classification": naturally preferred terminology sets among various cultures
- preferred and novel services: developers often use certain services and over-emphasise them in their designs.

It is suggested by Veldof (2000) and Marmion (2001) that information on library web sites is typically identified and structured in a librarian-orientated fashion which does not accord with the users' needs, preconceptions and mental maps; their *organising principle* is inappropriate (Gullikson et al.1999).

The SLAM library site had originally been put together early in 2001 as an M.Sc. web publishing project. It was officially launched in late June, being publicised to readers via internal email, library stationery, flyers and posters, and promoted generally via submission to medical library listings and to the main general search engines and directories. Outside the scope of the present study, there has been no user feedback to highlight particular problems. I anticipated when implementing the initial design that that users might encounter problems with:

1) navigation using the nested menus and journal lists
2) general comprehension of library terminology ("holdings", "classification scheme", "subscriptions", etc.)
3) determining how information about library services is organised
4) determining the most appropriate resources to meet their information needs
5) distinguishing appropriately between locally served and web based sources (free and fee-based)
6) accessing electronic journals
7) identifying journal information (current titles, print journals, electronic journals)

This project aimed, via a combination of appropriate usability testing methodologies and a corroborative analysis of transaction logs, to answer the questions:

- Is the site:

    o readily intelligible, i.e. not confusing to the reader
    o intuitive and easy to navigate (with respect to overall structure, navigation, labelling, searching/browsing, general features)
    o visually attractive
    o consistent in design and terminology?

- Are the readers able readily to locate information about library services?

- Are the readers readily able to locate through it the sources of mental health and community health information they need? Is its scope and content, as far as is possible, adequate and appropriate to the needs of the readership?

- Does the way in which information about library resources is presented accord with the reader's mental maps? In particular, is the division clear between locally served and web-based resources?

Overall, my aim was to generate a set of *evidence-based* proposals for redesigning or modifying the site (Guenther 2000). I sought not to focus narrowly on design and navigation aspects of usability, but to go some way toward assessing the usefulness, value and appropriateness of the site *content* in relation to the perceived role of the library within the trust (cf. Halub 1999, and Appendix 2). One question that was uppermost in my mind (cf. McCready 1997), particularly in relation to web resource guides, was "how much is too much?"

Depending on one's user population, *accessibility* can become an important aspect of usability. Web accessibility is a major subject in itself; while my primary focus was elsewhere, I attempted to bear in mind basic accessibility issues, given that the site might be accessed by health professionals with visual impairments (e.g. physiotherapists, dieticians) for whom the library has a legal duty under the Disability Discrimination Act 1995 to provide information in an accessible form.

II. Related literature
II.1) Web site design

As I developed the site, I drew on material on design and management of web sites for libraries and information services (Clyde 2000, Cottrell and Eisenberg 1997, Fourie 1999, Gullikson et al. 1999, Houghton 2000, Kalbach 2000, Klein 2000, McCauley 2001, McCready 1997, Marques 1999, Nicotera 1999, Orna 1992, Quintana and Bardyn 1996, Rosic-Hristovski et al.1999, Schnell 2001, Tennant 1999), general literature and guidelines on web site design and navigation (e.g. Degener, Eskins 2000, Farkas and Farkas 2000, Lynch and Horton 1997, Neilsen 1997, Nielsen 2000a, Nielsen AlertBox, *passim,* Raymond 2001, SitePoint *passim*, Usability.gov (2001a), Web Developer's Virtual Library *passim*, Web Design Group, WebReview.com *passim*, WebTechniques), and heuristic checklists (Davis 2000, Gaffney 1998, Instone 1997b, Kaiser 2001, Nielsen 1994a, 1994b, Tognazzini).
The *NHS Web site identity guidelines* (Department of Health 2000) were borne in mind but not rigidly adhered to, as I perceived them to be too limiting (see Appendix 3).

II.2) Web site usability: methodologies

Overviews of web site usability issues are provided by Davis (2000), Head (1999), Lee (1998) Murray and Costanzo (1999), Nielsen (1997a, 2000) and Spool (1998). Monash (2001) provides a concise and clear overview of typically occurring usability problems. Usability testing methodologies in general, their applicability, uses and limitations are described by Anthony and Formidoni (2001), Campbell (1999), Fichter (2000), Fowler (1997), Instone *passim*, Levi and Conrad (1998), Usability.gov. (2001b), UserDesign.com *passim* and WebWord *passim*. A review and critique of web heuristics is offered by de Jong and van der Geest (2000). Card sorting is described in detail by Frederickson-Mele et al. (1998), Fuccella and Pizzolato (1998), Gaffney (2000) IBM (2001), StepTwo (2001) and Robertson (2001). Matylonek (1999) provides a detailed discussion of card sorting and cluster analysis as a tool for the initial design of library web sites. Formal observation is described in detail by Dickstein and Mills (2000). Category membership testing is described by Frederickson-Mele et al. (1998). The use of focus groups in usability testing in general is described by Nielsen (1997b).The library literature includes several accounts of the use of focus groups in library service evaluation: Young (1993), Valentine (1993), Widdows et al. (1991), Meltzer et al. (1995) and Glitz (1997).

II.3) Web site evaluation: library and information services

A number of studies have focused on evaluating the content and design of library web sites. Whalen (1996) carried out a brief qualitative study of academic and public library site features. Stover and Zink (1996) developed an evaluation tool for the design of library home pages based on contemporary guidelines, and evaluated the home pages of 40 American and Canadian higher education libraries. Clyde (1996) carried out a content analysis of school and public and library web sites in 13 countries.

Quintana (1996) developed a set of content and design principles for health web sites and used them to evaluate ten well-known services. Cottrell and Eisenberg (1997) developed a six-factor framework for web site evaluation and organisation. Cohen and Still (1999) carried out a comparison of the web sites of research university and two-year college library web sites, evaluating them in terms of their provision of information about their services and their support for reference, research and instruction, and of particular features of their design and functionality. Misic and Johnson (1999) carried out a comprehensive benchmarking exercise comparing web sites of business schools. Dewey (1999) studied the findability of links on the library web pages of members of an American university consortium. Sowards (1998), in a highly detailed study, established a theoretical typology for library guides to web resources in terms of their depth, organisation and design features. Osorio (2001) provides a useful literature review and an account of a content and design evaluation carried out on 45 science and engineering libraries. The only work relating to health libraries that I have been able to find was that of Tannery (1998) who analysed American academic medical centre libraries, establishing a method for characterising and describing their design and content.

II.4) Web site usability: library case studies

Although usability evaluation is an important component, together with content analysis and web log analysis, of web site evaluation and redesign, there are relatively few published studies of re-design projects relating to library web sites that make extensive use of formal usability methods, and those that do all relate to large American or Canadian academic libraries. These include Clairmont et al. (1998), Dickstein and Mills (2000) and Veldof (1999a, 2000) at the University of Arizona, Hennig et al. (2001a, 2001b) at MIT, McMullen (2000, 2001) at Roger Williams University, Chisman et al. (1999) relating to the WebPAC and library web site at Washington State University, Prown (1999) at Yale University, Cardwell and Hunker (2000) at Bowling Green State University, France et al. (1998), of the MARIAN experimental OPAC at Virginia Tech University, Dean et al. at University of Wisconsin-Madison (1998, 1999), Smart et al. (1999) at the University of California, San Diego, and Mitchell et al. (2001) at Georgia Southern and Appalachian State universities. An important new study by McGillis and Toms (2001) of the Memorial University of Newfoundland library web site has just been published. Veldof (1999b) offers a general overview of usability testing of electronic library services. McCready (1997) describes a library web site redesign at Marquette University that depended exclusively on focus groups. There is little of specific relevance to health libraries other than Guenther's study (1999), which describes a medical library portal design project that made extensive use of focus groups.

III. Methodology

It is widely held (e.g., Nielsen 2000b) that the best results in usability evaluations come from carrying out as many small tests as possible. My testing combined a number of different methodological approaches. In the *preliminary phase* my objectives were to:

1) Develop a succinct content and design checklist and use it on a selection of web sites of NHS libraries similar to my own, as a benchmarking and evaluation tool (cf. Hennig et al. 2001, Misic and Johnson 1999) and source of new ideas (cf. Clairmont et al. 1998, Hennig et al. 2001a);

2) Analyse feedback from the online forms on the site, and other forms of reader input (e.g. email messages to library staff);

3) Conduct focus group meetings with different groups of staff in order to identify key issues from the users' perspective, to gather ideas for development of the site, and to determine if there were any issues requiring more detailed investigation;

4) Carry out a questionnaire survey of local library staff and web development staff to gather their opinions of the site.

The *main phase* of the project consisted of the following activities:

5) Conducting heuristic evaluations of the site using Gaffney's and Nielsen's checklists (Gaffney 1998, Nielsen 1994), the National Institute of Science and Technology (NIST) usability analyser tool WebSAT (NIST 2001) and the accessibility tool Bobby (CAST 2000) as a means of identifying obvious usability problems;

6) Carrying out formal observation testing involving commentaries by and observation of individual testers carrying out real information-seeking tasks (as described, e.g., by Anthony and Formidoni 2001, Clairmont et al. 1998) to identify possible problems with specific task and functions;

7) Conducting card sorting tests on a group of testers to evaluate the structure and organisation of the site and its correspondence with users' mental models and expectations; analysing the results using the IBM free software USort and EZCalc (Dong et al. 2001, Gaffney 2000);

8) Carrying out a category membership and label intuitiveness test: asking a representative group of users what they would expect each of several specified main categories to include, and what each menu item (e.g. "locally served databases (CD-ROM))", means to them compared it with its intended meaning;

9) Analysing server logs (using the externally hosted web statistics service eXTReMe Tracker) to determine user characteristics (geographical location, browser version, connection speed, screen resolution, which pages are being accessed and how frequently) and how users are reaching the site; compare this with usability test results (Kelly 2000); also to analyse the statistics on site searches provided at regular intervals by the (again externally hosted) FreeFind service (http://www.freefind.com) as a means of monitoring usage trends (cf.Tillett, 2000);

10) Putting forward proposals, based on the findings, for revisions of the site.

My task list for the observations was based loosely on those of Benjes and Brown (1998), of the MIT redesign project (Hennig 2001a) and of the Washington State University project (Diller et al. 1999). I also adapted my recording sheets and exit questionnaire from those of this latter. The content and design evaluation checklist was loosely based on that of Hennig (Hennig 2001a).

A total of 32 participants was recruited for the tests via trust-wide email within SLAM (it was not, unfortunately, possible to recruit CHSL or Lambeth Social Services participants in this way, as there is no means of sending circulars within these organisations from SLAM sites) and through personal contacts.

Despite my providing an incentive (the offer of a free lunch in the staff canteen) it proved difficult, owing to the pressures of people's work, to recruit participants for activities which required extended time to be spent in the library, such as the focus groups and usability tests. In practice, most of those who took part were people based on the Landor Road site or in premises nearby. This issue underlay my decision to modify my original plans, and carry out a form of card sorting test that users could carry out in their own time and return by post.

Demographic information was recorded for each tester (cf. Davis, 2000) and is summarised in Table 1a. Among the volunteers, there was a preponderance of medical staff and of professional non-clinical staff (such as trainers, information management staff and clinical audit staff); also there were considerably more women than men. I was unable to recruit participants from certain groups (health care assistants, pharmacists, social workers) hence the sample was not entirely representative of the library membership, nor of the intended user group as a whole. There was, however, a reasonable spread of backgrounds and a wide variation in levels of information and computer literacy; most people assessed their Web searching ability as being at either a "novice" or a "skilled" level. Only three participants reported making extensive use of the site before taking part in usability testing activity, thus the results of a priori tests were very little affected by previous exposure to the site. I also asked participants for information about other web sites they used, and which library web sites, if any. The results are summarised in Table 1b.

It is often recommended (e.g., by Clairmont et al.1998) that usability problems discovered in the testing should be rectified immediately, rather than waiting for tests to be completed, in order to provide the opportunity of re-testing an improved version. I acted immediately on minor coding and linking problems, and on several of the substantive issues mentioned by focus group and observation test participants. Unfortunately, because I am unable to upload new content to the STLIS web server directly—files need to be sent to the webmaster for uploading, and there were some significant delays (caused by system failures, sickness and holiday absence, etc.) in the revisions taking effect—it was difficult accurately to track the effect of changes against test results. Given the limited time available, there was also an inevitable time conflict between conducting the tests and revising the site.

A list is given in Table 2 of the main changes that were made to the site during focus group and observation testing. (Items in square brackets [ ] refer to content enhancements not prompted by usability test results.)

1) A small sample of six NHS library sites was selected for the benchmarking/content evaluation: two from the London consortium (Central Middlesex, Bloomsbury Healthcare), two from the South Thames consortium (Brighton Healthcare, Chichester Health Libraries), and two well-known sites from other parts of the country (Glenfield Hospital-- Leicester, Exeter Medical Library). The libraries were selected deliberately for the range of approaches to navigation and design they represented, and the range of their online content. The sites were viewed on a 450MHz AMD K-6 PC having dial-up access to the web at 56Kbps, running Windows 98 and Microsoft Internet Explorer 5.5, with a 17" monitor affording 800x600 resolution.

2) I retained copies of all feedback on the site provided via email, and made a note of verbal comments.

3) I was able to recruit nine participants in all for three separate focus groups run at lunch times; each group had three members. All were given about fifteen minutes to "play" with the site before each of the sessions. I facilitated each of the groups, which lasted about 45 minutes. Each group member was given a copy of the script (Appendix 4) before the session started. I tape-recorded each session, and took notes on the discussions.

4) A questionnaire survey (Appendix 3) was sent out to the webmasters of the Trust, the Institute of Psychiatry, and STLIS, to library staff on site, and to local library managers.

5) I scored the site myself against Gaffney's checklist (1998) (Table 5) and against Instone's (1997b) adaptation of Nielsen's (1994) usability heuristics (Table 6), and submitted the site to WebSAT (NIST 2001), obtaining evaluations against WebSAT and IEEE standard 2001-1999 guidelines. I also tested the site using the downloadable version of Bobby 3.2 (CAST 2001. Bobby is a freeware Java program that carries out automatic validation of web sites against the World Wide Web Consortium's (http://www.w3.org) Web Content Accessibility Guidelines version 1.0.

5) I recruited seven testers in all for the observation test. Testing was carried out on one of the reader PCs in the library. The computer concerned was a Dell Pentium III machine of 450 MHz, running Windows 95 and Internet Explorer 5.0, with a 17" monitor at 800 x 600 screen resolution. At the start of each test I gave the participant a script and list of tasks (Appendix 4); I informed them that I would sit with them, make notes of how they were approaching the tasks, time each task, and help them if necessary but not too much! They were instructed to think aloud as they performed the series of tasks. I recorded the time they took to complete each task, and noted the problems they encountered on a standard record sheet (Table 8). Each session was tape-recorded. The fifteen tasks, some of which had a number of different components, were designed to address anticipated usability problems (see above, p.9). They covered all main areas of the site. Some, especially those relating to journal and database information, were quite deliberately designed to be hard. The set of tasks was not formally piloted, although a few very minor modifications to it, relating to the wording of questions, were made after the first test. The tests took between half an hour and forty minutes. The usability metrics derived were: percentage of tasks completed, number of false starts for each task, longest time taken for each task, number of prompts required per task per user, and user satisfaction ratings (cf. Rhodes, 2001, Nielsen 2001b).

6) I recruited volunteers for the card sorting test via a trust-wide email. I created sets of paper slips (quicker to produce than cards) using a photocopier and guillotine, one slip for each item on each of the menus. I also included menu category headings among the slips. These were sent out with an instruction sheet (Appendix 5). Subjects were asked to sort the slips into categories, using either one of the menu headings as a label for the category, or devising their own heading if they preferred. I included in each package a plentiful supply of paper clips and several blank slips. I entered the results when I received them on USort (see above, section III.7) and analysed them using the cluster analysis software EZCalc.

7) Respondents were asked to complete a detailed label intuitiveness/category membership questionnaire (Appendix 6). This provided screen shots illustrating the main menu and sub-menus, alongside unrelated pages from the site; respondents were asked what they would expect to be included in each main category, and what sort of information they thought each of the links would indicate. The items included two external links. The questionnaire was distributed in a trust-wide email; I also recruited participants in person.

8) The eXTReMe Tracker script was inserted on the site home page. Site activity was monitored informally every week or so during the period of the tests. (eXTReME Tracker is a free transaction logging tool which operates via a JavaScript included within the page that is being monitored; it provides a cumulated record of activity from the time the page is uploaded to a site until the present). FreeFind was configured to deliver email reports of search activity each week.

	Focus groups	Card sorting	Labelling	Usability tasks	All
Staff type					
administrative	2	2	0	0	4
professional non-clinical	3	3	2	2	10
nursing	2	0	1	2	5
PAMs	1	1	0	1	3
psychologists/ psychotherapists	0	2	1	1	4
medical-senior	0	0	0	1	1
medical-junior	0	0	2	1	3
research	1	0	1	0	2
Gender					
male	2	2	2	4	10
female	7	6	5	4	22
Total	9	8	7	8	**32**
E-mail within trust?					
yes	8	8	6	7	29
no	0	0	2	1	3
not stated	1	0	0	0	1
Self-assessed searching ability					
naïve	0	0	0	1	1
novice	4	5	6	1	16
novice/skilled	1	0	1	2	4
skilled	4	3	1	3	11
expert	0	0	0	0	0
Access to Web within trust?					
via own PC	2	1	3	1	7
via library	26	0	1	2	9
no	1	7	4	5	17
Access to Web at home?					
yes	5	6	5	4	20
no	4	2	3	4	13
%	55.6%	75.0%	71.4%	50.0%	**62.5%**
Use of Web for information seeking					
hardly ever	0	1	2	2	5
less than once a week	3	4	2	1	10
once or twice a week	3	3	3	2	11
three or four times a week	2	0	1	2	5
once a day or more	1	0	1	1	3
Previously used library web site?					
yes	3	1	2	0	6
no	5	7	6	8	26
Use of other library web sites?					
yes	3	1	3	0	7
no	6	6	5	8	25

Table 1a. Sample demographics

Web sites mentioned by more than one participant

PubMed MEDLINE
Sainsbury Centre for Mental Health
Royal College of Psychiatrists
Department of Health
Doctors.net
NICE

Library web sites cited as being used by participants

Brunel University
University of Greenwich
Institute of Psychiatry
University College London
King's College London
British Library
public libraries (unspecified)
Goldsmiths' College
University of York

Table 1b. Web sites used by test participants

Change made	Reference
17/7/01	
"How to reach us" changed to "travel information" in General-menu	6 task 14
[Cochrane guide downloaded—link put in to this rather than to CRD site]	
"Site search" link moved to top of all menus	6
Search hints included on search page; size of search box increased	3; table 4
Interlibrary loan page condensed so that links to forms are visible without scrolling down	
New shorter URL set up using URL forwarding service	table 4
Yellow bar removed from underneath table in CD-ROM.htm	6 task 4
Link to other libraries included in general-menu	
Changed "article supply" to "request an article" in journals-menu	6 task 3
[Uploaded new lists of links on health statistics and health management]	
19/701 and 21/7/01	
Altered note about download times on journals pages	6 task 1
Changed "the internet" on menus to "links"	6, table 9
Included link to free bibliographic databases in internet menu—as 'free Web databases'	
Added (CD-ROM) to menu heading 'locally served databases'. Amplified 'online databases' to 'commercial online databases'.	
Italicised main heading in currently displayed menu to aid clarity of navigation	6, task 2
Changed position of catalogue searching info and classification list on holdings.htm; changed catalogue link to a 'deep link' directly into the SE Thames catalogue rather than home page with instructions as to how to find the right subset of the book catalogue	6, task 9
[Uploaded new list of meetings and conferences information]	
Added note in print journals list about how to find the journals on the shelves	
Altered 'complete holdings' to become a general journal information page, i.e. to include information on current titles and provide links to electronic journals information and all journals list. Renamed page as 'journal holdings' Scrapped separate current titles page.	6, task 1
Put ATHENS link on journal menu. Changed "complete holdings" to "journal holdings" on journal menu	
Rearranged CD.ROM.htm to put information about end user searching higher up the page, and guidance on when links will lead. Made language of page a bit more succinct. Provided links to 'more information' from within table headings for each database rather than depending on 'more information' link at the foot of the table.	6,task 4
[Added information about/link to BioMedCentral in e-journal info page]	
Changed 'Catherine's cool sites' on internet menu to 'Subject guides'; changed page title to "Subject guides: 'Catherine's cool sites'"	6, table 9
[Included new page on buying books and obtaining official publications—link from holdings.htm]	
9/8/01	
[Added bibliography on evidence-based psychiatry (link from ccs-mental-health.htm)]	
Included information on public libraries in libraries-accessible-to-SLAM-staff.htm	
Changed "site search" on menu to "search this site" for increased clarity	8.2.h)
Incorporated new versions of graphics, provided by trust webmaster, in header	4

Table 2. Changes made to site during usability testing

IV. Results and discussion
IV.1) Content and design evaluation

This content evaluation was not intended to be comprehensive, merely indicative of current practice and trends in the sites of libraries broadly similar to my own. The results are summarised in Table 3.The following was noteworthy:

a) There is considerable variation in navigation systems used: I found frames, "faux frames", navigation bars, hierarchies of links, and extensive used of internal anchors/bookmarks.

b) There is a wide variation in the categories of information given on the home page.

c) There is wide variation in the scope and content of the sites and in the services they provide, varying from the brief outline (Chichester) to the hugely detailed (Exeter).

d) There is variation in the use of additional navigation aids: four out of the six sites used site search, one of these had also provided a site map, two had neither.

e) Sites tend to group information about library services on a single long page.

f) Typically, print and electronic journals are listed together on one indexed alphabetical list; only one site (Exeter) had separate lists for print and electronic formats. Lists of electronic journals typically (four out of six) include links to the relevant publisher's or aggregator's web site. One site (Chichester) did not list any journals.

g) Provision of book catalogue access varied: one site provided a link to a university Web OPAC, two others to a consortium union catalogue, another provided access only within the trust network to the catalogue, and the others had no access at all.

h) Databases available within the library were generally listed and described in varying levels of detail under the general heading of "databases". Libraries situated within the areas in which pilot schemes providing web access to databases and journals are currently running, provided the facility to log into these within the site.

i) Sites did not generally have any significant uniquely developed content. One exception was the Knowledgeshare clinical knowledge management web site at Brighton. Several. however, had put together extremely useful lists of resources not found elsewhere, e.g. MCQs (Brighton), library training guides (Glenfield), electronic medical textbooks (Exeter), sources for tracing practice guidelines (Exeter).

j) All the sites except Chichester provided some selected links to external web sites. The Exeter and Glenfield lists are comprehensive and highly developed.

k) Most of the sites make little use of interactive features, typically providing only one or two. Where available, these vary considerably: Glenfield has a message board, a chat room and online polls. Exeter has an online membership registration form, and Brighton has online book and journal article request forms.

Table 3. Library web site evaluation

	Bloomsbury Healthcare	Brighton	Chichester	Central Middlesex	Exeter	Glenfield
Type of library and host institution	acute trust/university hospital	acute trust	acute and mental health trust	acute trust/university hospital	combined trust library managed within University system	acute trust
What is the overall structure of the site? What navigation method does it use?	hierarchy of links from home page—links lead to pages behind via bookmarks	navigation bar, hierarchies of linked pages

search box on home page

navigation system and graphics are integrated with those of main trust web site | uses country house metaphor for navigation—icons link to single pages | faux frames links from tables

search box on site index – available on each page, also contact details for webmaster | hierarchies of links, with extensive use of TOCs, bookmarks

shallow menu structure

site search on home page | frames, internal anchors within pages

hard to tell what the organising principle of the site is

site map

site search |
| What are the names of the broad categories on the home page? | library information services to members services to regional NHS libraries NVQs local libraries external sources | opening hours how to contact us staff library services disclaimer | switchboard servants' hall library map room study | home page contacting the library library services contents page service journal holdings list links to other sites comments form finding the centre | how to find us search entire site guide to the library library bulletin catalogue list of journal holdings new books added to the library hot links electronic journals electronic textbooks practice guidelines professions and specialisms primary care local websites Parkinson's Group—library presentation notes | frontpage library services more about us (specialities, staff, opening hours) library resources (books, journals, multimedia) kewl sites (sic) searching tips search the web databases guestbook message board |

	Bloomsbury Healthcare	Brighton	Chichester	Central Middlesex	Exeter	Glenfield
What are the names used for links that most libraries have, e.g. services, policies, hours, reference, interlibrary loans etc.?	library information services to members (includes enquiries, interloans, current awareness, training, photocopying, equipment, postal services, charges, preparing to do a literature search, QUEST, Ovid pilot) resources (books, journals databases, internet, multimedia) contact details travel opening hours membership staff list	journals additional free full text sites finding articles on a subject (database guide) ask a librarian (enquiries) library news book catalogue to request a book training current awareness links to local library and information facilities comments/feedback	switchboard—how to contact us library— basics, holdings servants' hall— library staff map room— how to find us study—study skills guidelines, user support	membership, collections, borrowing, renewing loans, returning loans, services (includes interlibrary loans, photocopying, journal contents pages, bibliographic databases, telephones), opening hours, contacting the staff	opening hours staff user registration journals books reference books videos departmental libraries catalogue borrowing procedure returning material reservations interlibrary loans photocopying CD-ROM searches online databases internet access telephone local libraries	interlibrary loan requests online databases (includes both locally hosted and web-based) computer facilities database and internet training library walk-in clinics books journals multimedia
How are links to commercial databases, external web resources, and journals organised?	journals has information page (print and electronic) which links to list—no hyperlinks to journals—alphabetical list with bookmarks categories are journals, books, databases, multimedia, internet	links to OVID pilot, local networked databases, web sites from database page—all combined in one page links to journals from journals page—combined print and electronic list with access information—alphabetical list with bookmarks	there aren't any	combined print and e-journals page with links to publishers' sites—alphabetical list with bookmarks link to OVID pilot (databases, journals)	information on e-journals with list of accessible titles separate list of print journals access/holdings information combined—alphabetical list with bookmarks list of electronic textbooks by medical speciality guide to databases with links for direct access where available	combined list of print and electronic journals with links—has alphabetical list with index 'library resources' categorised into journals, books, multimedia multimedia are listed; new books lists are provided

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	Bloomsbury Healthcare	Brighton	Chichester	Central Middlesex	Exeter	Glenfield
Is access available to a Web OPAC?	link to North Thames union catalogue. library catalogue available only on trust premises (QUEST network)	no—links direct to ST libraries' catalogue (like own site)	no	no	yes—Exeter University catalogue	no—but forthcoming
What (other) interactive features do they have available?	guest book	journal article request form book request form	none	comments form contents page ordering form	online membership registration form	message board chat room booking forms for training
Does the site have any uniquely developed content (online tutorials, search guides, etc.)?	no	MCQs list Knowledgeshare project site	no	no, but very good lists of web links	user group bulletin massive list of 'hotlinks': includes links to reference sources, job vacancy sites, copyright information, newspapers, journal impact factors, journal homepages and instructions for authors, web based email, information for patients, professional specialisms, links to local web sites, etc. Parkinson's Group—library presentation notes	collection of library training guides—includes guides to web design has an extensive, well-organised list of links
What is not on the site, that one would expect to be included?	nothing obvious	content is very comprehensive	external links information on collections map of site and/or locality	site has most of what one would expect	site is hugely comprehensive	site is very comprehensive some content is gimimicky, e.g. Bravenet Free Links (it wasn't working), Yahoo weather

	Bloomsbury Healthcare	Brighton	Chichester	Central Middlesex	Exeter	Glenfield
How are images used in the site? Do they use mostly text links, or many icons? Are there photographs? Is there a separate text-only version?	predominantly text links—coloured buttons used in page design but not as links; background UCL Hospitals logo on each page	none	site uses quirky, amusing Victorian pen and ink drawings for decorative/illustrative effect, and icons for navigation	trust logo and site map only	trust logo, library logo, university logo only	animated GIFs, static GIFs, photographs, backgrounds, buttons used with riotous abandon
How would you rate the aesthetics of the site?	minimalist, clean, straightforward, easy to read; makes extensive use of bulleted lists and white space design is consistent	colour is insipid; font sizes are mixed; excessive use of tables and boxes with borders detracts from legibility	attractive and distinctive	consistent, clean, straightforward, clear language, good use of colour	use of tables involves large areas of blank space and is a bit cumbersome information is very detailed—more than some readers need or can cope with?	in terms of graphic design and navigation this site is a complete mess! breaks all the rules and probably belongs on the "HTML hell pages"…but… obviously the work of an enthusiast with a great commitment to health library services
What is your opinion of the overall usability of the site?	pages are slow loading—may be do with background? some typographical errors and broken links language is very clear, concise, straightforward and user-friendly some information requires a lot of drilling down to find no site search box or site map provided—but possibly not necessary	language is jokey and friendly-sounding extremely useful site with lots of good content, easy to navigate, not particularly attractive visually, but this is to do with the parent site and its design guidelines	country house metaphor is misleading—does not in my view provide an effective model of the site, and is not appropriate to content content is much thinner than one would expect from a library of this importance, whose manager used to be in charge of the STLIS web site!	very well constructed and clear site with good content and online facilities. wasn't immediately obvious that there were links to two libraries on the site index—the other library is on another trust site not all items of content are listed on site index—bit confusing as to what is where	outstanding site in terms of content very utilitarian visually shallow menu structure and use of internal anchors makes site relatively easy to navigate not entirely clear that several of main links from home page are to collections of web resources—not sure what principle has been adopted for organising these	site is fun to use despite chaotic design; has features such as polls, external news services library staff page doesn't have email links individual pages do not have links to home page some external content is becoming encapsulated within frames

	Bloomsbury Healthcare	Brighton	Chichester	Central Middlesex	Exeter	Glenfield
How is the library linked to from the parent institution's home page?	it isn't	via 'departments'	it isn't	?	?	?
How does it link to its parent institution(s)?	it doesn't	it doesn't	it doesn't	links to PGMC, but not to trust main site	links to university and hospital	links to trust, education centre
Any special features?	home page has hit counter site has guest book—wasn't working has summary of annual report, ILS NVQ training information, page giving information on services to other NHS libraries, information on QUEST networking project within trust site	staff information includes CVs lists of MCQs and MCQ sites links to other local libraries site counter legal disclaimer library news specific link to NeLH on library services page	staff areas of responsibility are listed CHC libraries' logo on each page	home page has hit counter home page is also home page for PGMC	extensive library history/history of library logo lists of new books list of duplicate journals list of medical e-books sources for tracing practice guidelines links to local health sciences web sites	extended *caveat lector* warning about use of internet list of the library's coverage in terms of clinical specialisms FAQ

IV.2) user feedback

My aim of analysing this was thwarted, as there has been no feedback so far via the online form on the site. Several librarian colleagues within South Thames and London regional consortia provided comments on the site via email at the time I launched the site; these were highly positive (e.g. "do you hire yourself out?" "a very useful site", "it speaks to you", "it's all there"), but not particularly informative or useful as pointers to future development!

IV.3) focus groups

The main comments made are summarised in Table 4. Participants were generally enthusiastic and positive about the site, and were of the view that it was a potentially very valuable development of the library's services. They appeared to like the frames-based navigation and uncluttered, simple design; they also valued the site's being a gateway to external web-based resources as well as a guide to the library's own services.

Some of the recommendations made for additional content I felt were valuable appropriate; others (such as a database of clinical audit reports, a database of publications by trust staff) reflect interestingly on the perceived knowledge management role of the library; in my view these would be better on the main trust web site or intranet. A few obvious usability problems were highlighted, such as the excessively long and complex URL (subsequently rectified by using a URL forwarding service) and the need to provide more assistance for carrying out site searches.

According to the canons of focus group methodology, my approach was flawed in at least two respects:

a) the groups were too small; the preferred size is six to nine members (Nielsen 1997b) and perhaps also too heterogeneous (Young 1993).

b) it is normally recommended that moderators from outside the library should be used for focus groups. Ideally I should not, as the site's author and as the manager of the library, have been acting as facilitator myself; my doing so was liable to introduce bias, since participants would have felt reluctant to discuss issues freely in my presence for fear of causing offence. My position also made it more difficult for me to be objective. This was, however, unavoidable, given that the work was part of an academic exercise in which I could not reasonably involve, still less delegate work to, colleagues outside the library!

My acting as facilitator did, however, have the advantages, from the point of view of the dynamics and content of the discussions, that a) I had a close knowledge of the site and of the library service; b) I could set issues that people raised (about Web OPACs, for instance) in the context of other information service developments; c) I had an established working relationship with the groups' participants and did not have to start, as it were, from "cold".

IV.4) Webmaster/library staff questionnaire

Three formal responses were received from library staff, and a lengthy critique of design issues from the trust webmaster. Ideas for new content included: a picture of the library, more information about staff (photographs and areas of responsibility), more information about user education provision. One respondent felt that too much information was provided on some pages, e.g. the electronic journals and ATHENS pages, which was potentially confusing, and that the information on fines needed clarifying. Respondents generally liked the content and navigation structure, but were critical of the graphic design, e.g. typography of left-hand menu frame too small, poor quality logos. Items mentioned as being important to be available within two clicks of the home page included handouts (on searching, loan procedures etc.), the book catalogue, the journals lists, information about interlibrary loans, contact information, location details, and training information. The webmaster was critical of the logos and of the design of the user feedback form (for which I had used the template provided in Microsoft FrontPage!). He also felt that the home page was hard to locate, and that the top left-hand logo on the header should more properly link to this than to the STLIS home page.

IV.5) Heuristic evaluation, WebSAT and Bobby

Given the academic nature of the project, I was not able, as is usual and more methodologically appropriate (e.g. Fowler 1997, Levi and Conrad 1998, Instone 1997d, Nielsen 1994a) to use a group of other evaluators to carry out heuristic evaluations of the site. For this reason, it seemed a good idea to use a mixture of automated and manual methods as a means of compensating for possible bias on my part. Automated methods also have the advantage of being quick to execute. WebSAT uses sample sets of typical rules; it is itself an experimental system, and its rules do not form a comprehensive set of guidelines.

5.1). The Gaffney checklist did not appear to indicate anything startling. The problems it highlighted, apart from the language issue, were ones which were impossible to avoid owing to the need to use externally hosted facilities on the site. The language issue is further illustrated in tests 6), 7) and 8). The results are illustrated in Table 5.

5.2). The Nielsen/Instone checklist identified a number of significant issues, which are enumerated in table 6. They include: HTML standardisation, clarity of navigational structure, the inability to bookmark individual frames, use of the FONT tag, and consistency of labels, page headers and page titles.

Table 4. Focus group results

Likes	"Library on the desktop" aspect Navigation and design: clear and intuitive use of frames one item per page little scrolling needed; page content fits well within frame body Local map Union catalogues Use of language Links to web logs—these are very useful as they incorporate information circulated via email into a conveniently accessible format Principle of selecting key sites rather than having long comprehensive lists
Dislikes/criticisms	URL too long and cumbersome
	Date on introductory page in US format
	Lack of full web OPAC functionality
	Not clear what is password protected and what is not
	"Search this site" page is much too plain; would like prompts on search techniques, and examples
Suggestions for development or additional content	Union catalogue of serials across SLAM libraries List of professions allied to medicine links Update clinical governance material to include links to CHI and NICE Additional specialist bibliographies of relevance to trust, e.g. mental health informatics, cognitive-behavioural therapy, transcultural psychiatry Register of trust research Database of clinical audits More community health information, especially community profiling More on other boroughs

5.3.i) The WebSAT analysis flagged up a number of breaches, actual or possible, of WebSAT usability guidelines:

a) According to the IBM ease of use guidelines (IBM 2001), links should, where possible and appropriate, be at the beginning or end of paragraphs or sections of narrative text; too many links within a block of text can disrupt continuity and understanding.
There are numerous occurrences in the site of links without preceding line breaks. It becomes a matter of subjective perception on the part of the user whether this affects the readability of the pages.

b) Links should be descriptive of what the user will find upon visiting. On this basis, several of the links within the menus are too brief and cryptic.

c) There are instances where the BG colour and TEXT colour attributes are used alone, rather than together.

d) Links should preferably not open automatically in a new window, as this can cause confusion for novice users. It did seemed appropriate, however, as a navigation principle for the site that external content, such as e-journal pages, should open in a new window; users can then close the window without losing their place on the page.

e) The WebSAT guidelines deplore the use of horizontal lines. Their use can be defended, however, to break up text into manageable sections (Hobson 2000).

5.3.ii). Additional issues were raised by the WebSAT IEEE Guidelines analysis. (The guidelines are geared specifically to HTML 4.0, and do not all apply to HTML 3.2.)

a) DTDs are not included within the headers of all pages.

b) Metadata elements, other than those generated automatically by an HTML editor, are included only on the home page rather than on all pages. On the home page, the Updated, Content Selection and Dublin Core META tags are not used.

c) Copyright information is included only on the home page and on the introductory frame and journals lists, not elsewhere.

d) Telephone numbers are not given in international format

e) Several graphics files are larger than 3.5Kb.

f) Several HTML elements and attributes which are deprecated in version 4.0, such as <FONT>, <CENTER>, <B>, <I>, the ALIGN attribute of <P>, the LINK and VLINK attributes of <BODY>, the BGCOLOR attribute of <TABLE>, the WIDTH attribute of <TD>, and the HEIGHT attribute of <TABLE>, occur frequently. The BORDER attribute of IMG also occurs. (Within HTML 4.0 the use of Cascading Style Sheets is recommended instead to specify these stylistic features.) My difficulty here is that the use of CSS is not ordinarily permitted on NHS web sites (DoH 2000), the priority being that pages need to be readable by older browsers which ignore style sheets.

g) Some relative references point to directories, e.g. as in <a HREF="detail/"> rather than <a HREF="detail/index.htm>"; this does not provide proper server independence, as the default file can vary from server to server.

h) The PDF images used do not all have an ALT tag. All images should have ALT tags for accessibility purposes.

i) The results frequently cited as a usability error "found no protection against encapsulation", i.e. of external content with a site frame. However, all the external links are set to open in new windows. If a search engine links to a page other than the home page, the home page can be reached from a link at the foot, the properties of which specify <TARGET="_top">.

Table 5. Usability evaluation checklist for Web sites *(Gaffney 1998)*

	Compliance			
Feedback	Always	Sometimes	Never	Notes
It is always clear what is happening on the site		√		navigation systems is designed to ensure this
Users can receive email feedback when necessary	√			
All feedback is prompt		√		depending on how well site is monitored
Users are informed if a plug-in or browser version is required	√			Adobe Acrobat reader only
Users can give feedback via an email or form	√			
If necessary, online help is available			√	no help features are incorporated
Consistency				
Only one word or term is used to describe any item	√			
Links match titles of the pages to which they refer	√			
Standard colours are used for links and visited links	√			
Terminology is consistent with general web usage	√			
Error prevention and correction				
Errors do not occur unnecessarily		√		a confusing error message is generated by the externally hosted site search function if the search button is pressed without a term being entered; this cannot be avoided
Error messages are in plain language	n/a			no error messages
Error messages describe what action is necessary	n/a			are provided
Error messages provide a clear exit point	n/a			other than by
Error messages provide contact details for assistance	n/a			external web forms host

Usability evaluation checklist for Web sites (Gaffney 1998)	Always	Sometimes	Never	
Visual clarity				
The layout is clear	√			
There is sufficient 'white space'		√		some pages are a bit dense
All images have ALT text assigned		√		
Unnecessary animation is avoided	√			no animation is used
Navigation				
There is a clear indication of the current location		√		navigation systems is designed to ensure this
There is a clearly-identified link to the home page	√			all pages have a link to the home page at their foot
All major parts of the site are accessible from the home page	√			
If necessary, a site map is available			√	automatic site map generation facility available using the externally hosted site search provider is messy and unclear, hence not used
Site structure is simple, with no unnecessary levels	√			
If necessary, an easy to use search function is available	√			clearly visible on each menu
Functionality				
All functionality is clearly labelled	√			
All necessary functionality is available without leaving the site		√		book search is provided via a deep link to the STLIS site
No unnecessary plug-ins are used	√			only Adobe Acrobat reader

Usability evaluation checklist for Web sites (Gaffney 1998)	Always	Sometimes	Never	
Control				
The user can cancel all operations	√			using the 'stop' button on the browser
There is a clear exit point on every page	√			
Page size is <50Kb per page		√		journal lists are longer than this; would be better if database-driven rather than as flat files—a future development to aim at
All graphic links are also available as text links	√			
The site supports the user's workflow	√			one hopes so!
All appropriate browsers are supported	√			according to statistics on browser usage from eTReMe Tracker, q.v. most users have IE5.x or Netscape 4 and above
Language				
Jargon is avoided		√		difficult with a library site; may be a need tor a 'jargon buster' page
The language used is simple		√		Latin tags and biblical quotations apart, perhaps!

	Heuristic	Comments/rating
1	Visibility of system status	nested menu system means that it is not always clear which section of the site a page belongs to—a page is not always viewed in the context of its associated sub-menu
2	Match between the system and the real world	possibility of users becoming confused by library jargon; likely to be more of a problem for people who are not already familiar with the library's services
3	User control and freedom	"home" link is provided at the foot of each page "back" links are additionally provided from forms (the back link from the "request a search" form is misleading, since it always refers back to "CD-ROM databases") <FONT> tags and absolute values for table widths are frequently used site may be viewed in most browsers which support frames (tested in development using Browserola simulator)

4	Consistency and standards	Page heading "online databases" needs to be changed to "commercial online databases" to match link from menu; the page title needs to be amended from "commercially hosted online databases".
		
		 Titles of the following pages:
		     CD-ROM.htm
		     Bookshops.htm
		     April2001.htm (and other new book lists)
		     ccs-meetings.htm
		     Reach.htm
		     Site-search.htm
		 also need to be amended
		
		 Standard link colours are used
		
		 HTML versions need to be standardised—different pages written at different times with different tools. (Microsoft FrontPage seems to generate its own proprietary version)
		
		 META tags should be incorporated on all pages, not just home page

5	Error prevention	Not available other than on externally hosted facilities (forms, site search)
6	Recognition rather than recall	Possible problem with nested menus—some options are sometimes hidden
7	Flexibility and efficiency of use	Frames prevent bookmarking of individual pages Customisation is not possible
8	Aesthetic and minimalist design	Some information may be superfluous e.g. classification synopsis, list of current journal subscriptions
9	Help users recognise, diagnose and recover from errors	Error messages provided only on externally hosted facilities
10	Help and documentation	Site search has search instructions and prompts

Table 6. Results of heuristic evaluation (Nielsen 1994, as adapted by Instone, 1997b)

5.4). Bobby is primarily an accessibility evaluation instrument, which determines how readable pages are by accessibility equipment such as screen readers. The evaluations it provides are hugely detailed and thorough; it ranks accessibility issues for each page as priority 1, 2 or 3. It can also generate a summary report for the site.

Accessibility requirements are increasingly incorporated within general HTML standards and web design guidelines. Numerous HTML authoring tools, e.g. 1st Page and HTML-Kit, incorporate facilities for checking accessibility. Despite the fact that the site had previously been checked using TidyGUI (Appendix 1), which assesses compliance with usability guidelines as well as HTML validity, the Bobby evaluation identified numerous accessibility issues on the site which I had insufficient time to pursue in detail. Among the most significant were:

a) summaries of table data are needed in the file $D.ROM.htm
b) additional structural markup should be used for tables with headers
c) frames should be given titles
d) alternative text should be provided for ALL images
e) public text identifiers should be used in DOCTYPE statements
f) link phrases should make sense out of context (cf. above, 5.2.b)
g) relative sizing and positioning (% values) should be used for graphics and tables rather than absolute values (pixels)
h) ABBR and ACRONYM elements should be used to denote and expand abbreviations and acronyms.
i) NOSCRIPT alternatives to Javascripts should be provided

Ensuring Bobby compliance, even at the first priority level, would entail a considerable amount of work, even using a usability/accessibility toolkit such as A-Prompt (University of Toronto 2001). Given the small number of users who would be likely to benefit, this could not, unfortunately, be work of the highest priority in any realistic programme of site revision, even given the legal requirements and moral imperative of improving accessibility.

While all heuristics have limitations in terms of their specificity and exhaustiveness (de Jong and van der Geest 2000), heuristic evaluations are generally considered an effective method of preventing the most obvious and basic usability problems. The heuristic evaluations of this site, both manual and automated, did appear to highlight some significant problems. There is an inevitable subjective element in carrying out such evaluations, however, and it is possible, as we have seen, for guidelines to conflict (see above, 5.3.g.). Real-world site designs frequently need to represent a compromise between conflicting considerations; in practice (Thovtrup and Nielsen 1991, D'Angelo and Little 1998) guidelines and standards for interface designs are often ignored.

IV.6) Observation test

The results of this test are analysed in Table 7.The table presents only the main usability issues, not a comprehensive record of all comments made by each tester. A sample record sheet for one tester is given in Table 8. The tasks where significant usability problems were identified are discussed in more detail below.

A learning effect was apparent as the test was conducted; as they worked through the tasks, the testers learnt their way around the site, and by the end were able to find things relatively easily; several made remarks such as, "I've seen that somewhere", "I remembered where to find it". This is significant, in that it indicated that users found the site relatively easy to learn their way around. Some basic gaps in people's knowledge of basic browser functionality became apparent. One person used the browser search button when "site search" would have been more appropriate, another became confused by new windows opening from external links, and another (a professedly experienced searcher, who herself provides basic training in the use of the Internet) was not aware of the Find feature available in Internet Explorer 5's Edit menu. A marked variation in approaches to searching was apparent; some testers would go straight to "site search" to locate an item of information, whereas others clearly preferred to work their way through the menus (cf. Nielsen 2001a). The "menu browsers" among the testers often went to the more general category headings "facilities for readers" or "general information" if uncertain where to look for something. One tester drew my attention to two general usability issues: that the site uses "e-journals" and "electronic journals" interchangeably as terms (this should of course be standardised), and that the heading "general information" has information about the library, not, as one might expect, about the site itself.

One participant, who proclaimed herself to be a "naïve" searcher, became rather flustered and stressed (cf. Fowler 1997); the others, however, seemed quite to enjoy themselves, and expressed interest and pleasure at discovering a useful new information resource. Twelve failures to complete tasks and 15 prompts were recorded out of a total of 126 test events. The average unprompted completion rate per participant was 92%.

Task 1: *find out if library holds three different journal titles, and if electronic access to any of them is available within the trust*

To complete this task, testers had to find first of all the complete list of print journals, and subsequently the list of electronic journals. The way that information is presented about journal holdings in the earlier version of the journals pages was evidently confusing: three testers did not appreciate the significance of the terms "complete holdings" and "current titles"; three of the early testers went into the "current subscriptions" list by mistake; and two testers said they did not know how to find information on electronic journal access.

During testing, information from two pages was combined on to one page (see Table 2), which appeared to resolve the second problem. Two testers did not look in the correct part of the lists for the journal titles, e.g., looked for *Journal of Child Psychotherapy* under "C". The original form of the warning about file size, "this is a 94Kb file and may take a long time to download", which was given at the links to the journal lists, appeared to be acting, according to earlier testers' comments, as a strong disincentive to accessing the pages; it was subsequently amended to "N.B. this is a large file!"

Task 2: *find a list of evidence-based mental health sites*

Testers needed to locate this within a wider collection of mental health resources among the "Catherine's cool sites" or web subject guides.
One tester remarked that the menu heading "Catherine's cool sites" was not very informative; it was subsequently changed to "subject guides"
(which also, incidentally, proved problematic—see 8.2.b) below) Two testers went to "literature searching" instead of "links". Two testers complained that it was hard to locate an appropriate menu item. One tester complained that the nested menus were confusing to navigate; category headings in sub-menus were later italicised to improve the navigation. Another tester used the site search facility but failed to locate the relevant item on the list of search results.

Task 3: *find the online journal article request form*

Participants had to locate the online article request form, labelled "request an article". A link to this is available in the "journals" menu or from the "interlibrary loans and article supply" page. Three testers looked in "facilities" first (cf. 8.1). One tester was confused by the term "online form" in the task list. The label was changed to "request an article" from "article supply" during testing, as two early testers said that the latter was unclear.

Task 4: *find items of information about the library's CD-ROM databases*

This task required the participant to find a page "locally served databases" and links from it providing additional information and resources. In the initial version of this page, there was a link to "more detailed information" about the databases underneath a summary table. The page was divided by a yellow bar underneath the table. Two early testers failed to scroll down beyond the foot of the table to find the link; it was evident that the bar was acting as a disincentive to scrolling, and was removed in the later version. To improve navigation, the "more detailed information" link was moved near the top of the page, and hyperlinks to it created from the database names within the table. One later tester said that the link label "more about…" in the "guide to databases" was still confusing. Two testers did not understand the term "locally served databases"; it was subsequently amended to "locally served databases (CD-ROM)". One person complained that she found the system for accessing information on CD-ROMs confusing, at it was split between two pages, the summary table and the fuller "guide" page. Another tester said she assumed the links at the top of the 'more information' page were direct links to printable search guides, rather than a contents list.

Task 5: *find information about the ATHENS authentication system for electronic information resources*

Testers had to find a page, "ATHENS", giving information about the system. Three testers failed to locate it using the menus and had to be prompted to use the site search facility.

Task 6: *find out which libraries may be used by staff of SLAM*

This task required the testers to locate a page "other libraries" under the main heading "general information". Two people went to the external link "South Thames Libraries".

Task 8: *find out if electronic access to the journal <u>Current Opinion in Psychiatry</u> is available outside the trust*

Testers needed to find the electronic journals list, locate the title, and read off from it the information about its accessibility. One tester complained of not understanding the significance of the term "holdings". Two testers failed to read correctly the information on the page about accessibility, possibly because no column headings were visible at the top of the screen.

Task 9*: look on the South Thames union catalogue to see if the library holds a particular book*

This test required participants to follow the link to the union catalogue from the page "our holdings" accessible from the books menu. Two early testers went into the synopsis of the classification scheme by mistake, and several people had difficulty locating the union catalogue from the South Thames Libraries home page. The page was subsequently revised to place the link to the union catalogue in a more prominent position on the page. The link to the union catalogue was changed from being one to the home page, with accompanying instructions as to how to find the right subset of the book catalogue, to being a "deep link" directly into the appropriate section. This appeared to work better; apart from one tester who failed to locate the appropriate menu item, the only problems then occurring were within the functionality of the union catalogue itself!

Task 12: *find out if readers can use their own laptop computers within the library*

This task required readers to find the appropriate section of the "facilities for readers" page. One tester went into "about the library" and abandoned the task; the other testers used the site search. There is an issue with the externally hosted search facility FreeFind of how "tolerant" it is (e.g., if one puts in the term "evidence based", will it find "evidence-based") and what functionality (e.g., stem truncation) it incorporates; this needs to be investigated and clarified.

Table 7. Usability test data analysis worksheet

No.	Task	Maximum time (min.)	Total no. times unsuccessful (all testers)	Problem summary
1	Find out whether the library holds *Journal of Child Psychotherapy, Irish Journal of Psychologica Medicine, International J ournal of Social Psychiatry.* Is e-access to any of them available via NHSnet on trust premises?	7m 30s	4 (including all component tasks)	Accessibility information is confusing: two testers did not know how to find information on e-access as well as hyperlinking e-journals from print journal list, need to tell readers what the implication is of NOT finding a journal in the electronic journals list—this is not clear three testers went into 'current subscriptions' list instead of complete holdings—this is confusing—is this list necessary? three testers did not appreciate difference between 'complete holdings' and 'current titles' or of term 'hold' versus 'subscribe to' one tester remarked that site uses 'e-journals' and 'electronic journals' interchangeably as terms—this should be standardised two testers looked under 'Child Psychotherapy' for *Journal of Child Psychotherapy;* instructions are needed the heading 'general information' has information about the library, not about this site
2	Find a list of links to evidence-based mental health sites.	4m 30s	2	one reader kept clicking on 'search this site' legend rather than search button, giving rise to 'hall of mirrors'; can this be edited out? two testers went to 'literature searching' one tester became confused with nested menus two testers said it was hard to find the appropriate menu item one tester failed to see relevant item on site search results (early version) one tester said that heading 'Catherine's cool sites' wasn't very informative—later changed to 'subject guides'

No.	Task	Maximum time (min.)	Total no. times unsuccessful	Problem summary
3	You have discovered that the library does not hold the journal that contains an article you need. Find the online form that you can use to request a copy of the article from the library.	2m 35s	1	one tester had trouble with new windows opening from journals lists one tester confused by the term 'online form' three testers went to 'facilities' first two early testers said that the label 'article supply' was unclear
4	What databases does the library provide access to via its CD-ROM network? Which database is on a trial subscription? Which databases have search guides available to print or download?	5m 58s	3	one tester said the link 'more about…' was confusing one tester assumed that links at top of 'more information' page were to printable search guides one person said she found system for accessing CD-ROM information confusing, as split between two pages two testers did not understand the term 'locally served databases'
5	Find the page that provides information about ATHENS accounts. Are they available to staff who are not currently affiliated to or studying at an institution of higher education?	2m 45s	0 (but 2 prompts)	three testers drew a blank on menus—had to prompt them to use site search
6	Which libraries may be used by staff of SLAM?	2m 19s	0	two testers went to 'ST Libraries' CHSL access should be mentioned on list
7	What academic and professional qualifications does the part-time library assistant hold?	1m 15s	0	one tester thought email hyperlink would lead to a CV
8	Is electronic access to *Current Opinion in Psychiatry* available outside the trust?	4m 20s	2	one tester found distinction between 'catalogue' and 'holdings'--confusing
9	Does the library hold the book: Hester, Nolan (1999) *FrontPage for Windows 2000*. Berkeley, CA: Peachpit Press ?	5m 15s	2 (1 prompt)	two testers (early version) had difficulty navigating to 'find a book' with STLIS site two testers went into synopsis of holdings (early version) one tester (later version) had problem locating appropriate menu item—went to 'about the library'

No.	Task	Maximum time (min.)	Total no. times unsuccessful	Problem summary
10	You are looking for information on aspects of psychiatric rehabilitation and decide that you need to search the *Allied and Alternative Medicine* (AMED) database. In what form does the library provide access to this? Would you be able to search it yourself?	3m 10s	0	one tester found advertisement on site navigation page distracting one tester couldn't remember which databases were online and which were locally served two testers went to locally served databases and followed links from there one tester put subject terms 'psychiatric rehabilitation' into site search box rather than 'AMED'
11	A journal to which you are submitting an article requires that you use the Vancouver system for referencing your citations. Where can you find information about the Vancouver system?	3m 1s	0	two testers using site search missed link to correct page from search results page—why? one tester followed external link to Dr Felix site in error—was not aware of 'find' strategy for locating terms on a page
12	Can readers use their own laptop computers within the library?	1m 20s	1	one tester went into 'about the library' and got stuck other testers used site search issue of search terms "evidence-based/evidence based", "laptops/laptop computers"; are clearer instructions needed? is truncation possible?
13	What access to library services is available to patients, carers, and members of the general public?	1m 9s	0	no problems here; all testers went to "access and membership"
14	Which bus passes the site entrance?	1m 30s	0	page originally entitled 'how to reach us' one early tester thought this referred to electronic access all other testers found easily from 'travel information'
15	You have a complex search to carry out, you are uncertain of your bibliographic database searching skills, and in any case you have no time to get to the library. Find the form that will enable you to submit a literature search request to the library.	1m 5s	0	all testers found without difficulty

Table 8. Usability study task list: data collection form (sample)

Participant:…S--- V------…………………………………………..

Observer:… Catherine Ebenezer…………………………………

Date:……… 11/07/01…………………………………………

	Success?	*False starts*	*Begin time*	*End time*	*Comments*
1	yes	1	12.11	12.16	two 'heres' on the e-journals page—a bit confusing wasn't under Electronic journals but went to this first—flicked between print journal and e-journal lists
2	no	(2)	(12.16)	(12.20)	went to Literature searching on menu first—had to prompt to use site search—went to "other internet resources" –didn't find CCS—tended when doing site searches to look for subject keywords rather than resource descriptions
3	yes	3	12.21	12.22	worked her way through menu options—eventually got to Journals-didn't get idea of 'new window' straight away---had to be prompted to close it to get out of where she was

	Success?	False starts	Begin time	End time	Comments
4	no	(4)	(12.22)	(12.27)	Got to 'Locally served databases' eventually but didn't realise what it meant. When prompted to find, didn't scroll beyond end of table on CD-ROMs page. Seemed to find system for accessing information about CD-ROM databases rather confusing as is across two separate pages. Couldn't find legend saying 'trial only'; was looking in wrong column of table on CD-ROM pages.
5	yes	0	12.26	12.27	found very quickly
6	yes	0	12.27	12.28	looked in Facilities first, then Access
7	yes	0	40 seconds		found very quickly
8	no	(2)	12.29	12.34	looked at Internet again, used Site Search to navigate to Complete holdings. Needed to prompt to scroll down list. Information on Complete holdings page does not answer question—didn't realise that needed to go to E-journals page. Link to lww.com is not sufficient—needs to go to individual journal home page
9	no	2	12.35	12.41	went into STLIS classification scheme by mistake. Failed to see link to STLIS book catalogue; went into short loan list
10	yes only after prompting	2	12.41	12.43	did site search on 'psychiatric rehabilitation' instead of looking for specified resource. Remarked that site search is very useful

	Success?	False starts	Begin time	End time	Comments
11	yes	0	12.43	12.44	used site search
12	yes	1	12.45	12.46	thought that 'reach' on menu meant 'dialup' tried Access first
13	yes	0	12.46	12.47	found without difficulty using Access and membership page
14	yes	0	instantaneous		
15	yes	0	12.47	12.48	worked her way through menu headings; went to Literature search menu heading, then Request a search

Table 9. Usability test exit questionnaire analysis

Organisation of site:	
1 not at all	
2	
3	2
4	4
5 completely	1

Comprehensibility of site terminology:	
1 not at all	
2	
3	1
4	5
5 completely	1

Ease of use:	
1 very difficult	
2	
3	1
4	4
5 very easy	1

Visit again?	
1 no	
2 possibly/unlikely	
3 probably/likely	2
4 definitely	5

Comments of testers:

A lot of work for one person
Excellent literature searching facilities—
but not easily enough accessible from home
Excellent site
Likes literature search menu, table of CD-ROMs
Label 'the internet' should be changed to 'links'
'Catherine's cool sites' not an obvious label

Took time to become familiar with the layout
Could do with a glossary of [library] jargon and its meaning…it was like being
a foreigner with very little vocabulary..[however] I don't think this was the site's
problem here
Navigation became easier as the test progressed
I wasn't always clear about which area to search in
I was conscious of being watched—so not my usual relaxed self
Has given me an appetite to use again and familiarise myself [with information
resources]

Site is more helpful than any alternatives I've looked at

Fairly understandable; some links could be better clarified e.g. article supply
A clearly defined book search area may be beneficial
"Facilities for readers" a little confusing sometimes
Site search could be a little more obvious
Excellent links

A useful tool for someone who wants information quickly within the library

It took a while for me to understand the main and sub menus
Article supply: didn't immediately grasp what this meant
A lot of information, clearly displayed. Unfussy and easy to use

The wording was very user-friendly...it was all possible to follow easily.
I had no idea that so much information was available online. It is unfortunate
that I do not have this kind of access at work. I have already started to ask my
managers for better access to information via this site

Very easy to grasp the totality of the site
I wish I could use it from my office
The shortcomings of the site are all related to the limitations of the library. Can
a library web site be better than its library?

Task 14: *find out which bus passes the site entrance*

This task required participants to locate the page "travel information" under the category heading "general information". The page was originally entitled "how to reach us" but was changed after an early tester misinterpreted this as referring to electronic access.

The testers' exit questionnaire responses are presented in Table 9 above. Testers rated the site highly on comprehensibility of terminology, ease of use and likelihood of subsequent use, somewhat less highly on structure and organisation.

According to standard recommendations for usability testing (e.g. Head 1999), recording should not be carried out by someone who is too closely involved in the design. Since I had to carry out all the testing myself, my methodology was obviously thereby flawed. I found it impossible to refrain entirely from prompting testers; the very high completion rate observed (92%) may reflect that fact that I could not record accurately all the prompts and search hints that I gave to the participants as they carried out the tasks. Although I tape-recorded the sessions as well as taking notes, the tapes were sometimes impossible to decipher. These tests were successful, however, in identifying a number of significant usability issues.

Given the number of repeat problems observed in the tests, and the similarities with the results of other tests, it is likely in my view that a high percentage of the more obvious usability problems on the site were pinpointed.

IV.7) Card sorting test

Card sorting and cluster analysis is a usability evaluation method that is often adopted early on in the design of a site. Its aim is to discover those groups of services that are consistently associated, and to discover other groups or clusters that have similar associations (Matylonek 1999). My rationale for using it in this project was that I felt it would provide a clear idea of users' categorisation and association of information sources, this providing a corrective to the (possibly) librarian-centred organisation of the site as it currently exists.

Methods for conducting card sorting tests vary greatly, from those at the "soft" end, which emphasise user feedback, comments and suggestions, to those at the "hard" end, which emphasise the quantitative data that is the subject of cluster analysis. The method I adopted, of administering the test by post and using EZSort to analyse results, had advantages in terms of my own time and of the subjects' convenience, but had the disadvantage that I was able neither to clarify anything with the participants, nor to discuss with them the rationale for their choices, nor to obtain feedback from them. It is also rather inflexible in that it does not readily allow participants to create duplicate entries. With hindsight, I should have included a feedback form to complete rather than simply inviting them to comment on their sorting decisions (none of them did).

In the course of analysing the results, a number of specific problems became apparent:

  i)   testers included some items in more than one category. When this occurred, the first occurrence of the item encountered was taken;
  ii)   testers did not distinguish correctly the headings labels from the item labels. In such cases, the category label was set aside (there being no corresponding entry in the card list) and the item label at the top of the pile taken as the category label;
  iii)   I had inadvertently included within the set of slips to be sorted a number of duplicate items: "article request/request an article" and "book recommendation/recommend a book";
  iv)   the results were obviously being affected by user uncertainty caused by lack of intuitiveness of the item labels; with hindsight, fuller descriptions should have been given of the item contents, rather than just the page headings.

EZSort, however, does have the considerable advantage of permitting precise graphical representation of the results in a dendrogram using several different cluster analysis algorithms. Analyses of the results, computed according to the algorithms "average", complete" and "single" available within EZCalc, are illustrated in Figures 1 to 3. Unfortunately, the significance of these different algorithms is nowhere described (Dong 2000). Of the thirteen people who initially volunteered to take part, only seven returned results. While this would be considered sufficient by some authorities (Gaffney 2000), card sorting is most accurate with a larger number of users, given that at least one user is liable to create a completely idiosyncratic pile (Fowler 1997). Campbell et al. (2001) suggest a minimum of 20 users.

The following results are evident across all three charts:

  a)   "interlibrary loans" is associated strongly with "other libraries" and with "South Thames Libraries" rather than with journal or book categories;
  b)   "photocopying", "telephones" and "refreshments" are only loosely associated with other library facilities
  c)   "computing" is associated with online search facilities, rather than with general library facilities
  d)   participants appeared to have difficulty classifying "our holdings"; it does not convey a clear meaning apart from the context of information about books
  e)   "current awareness" is associated with "using the literature" and with "subject guides" and "search requests"

While cluster analysis cannot be depended upon exclusively for creating service categories—the most it can do is to provide a user biased association of service content (Matylonek 1999)--- these results provide some clear pointers for possible re-structuring of the menu system.
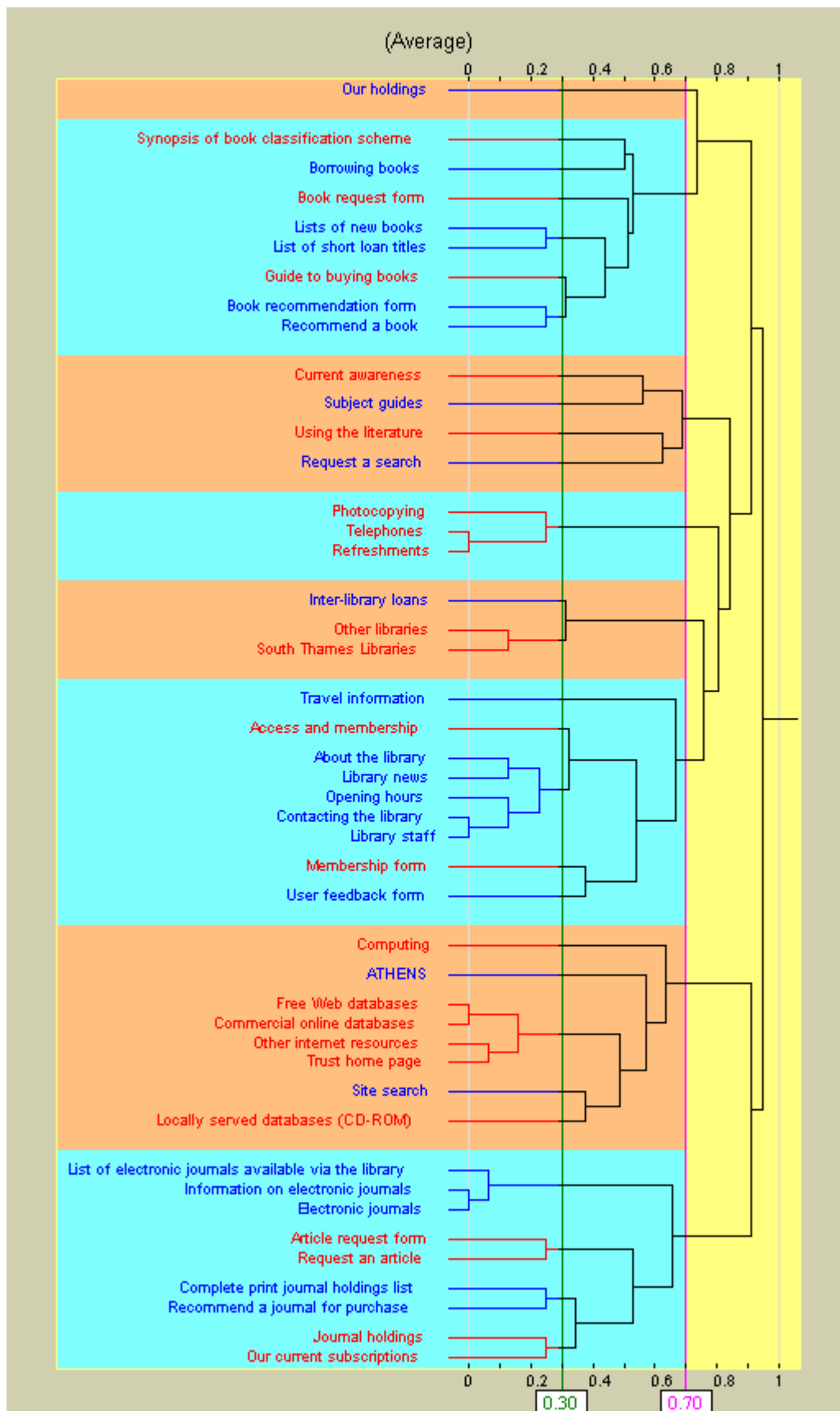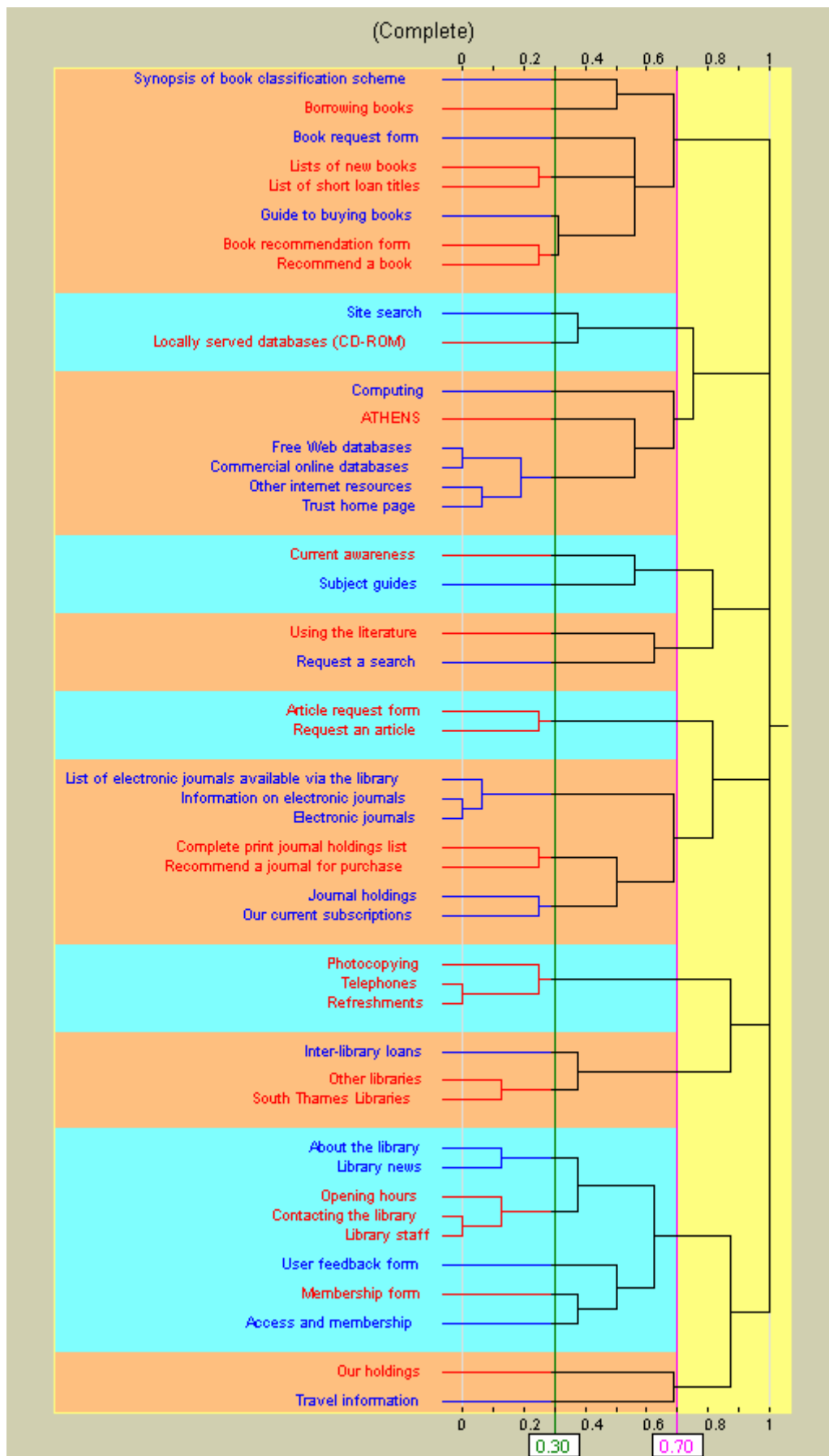
Figure 3. Card sorting test results: "average"
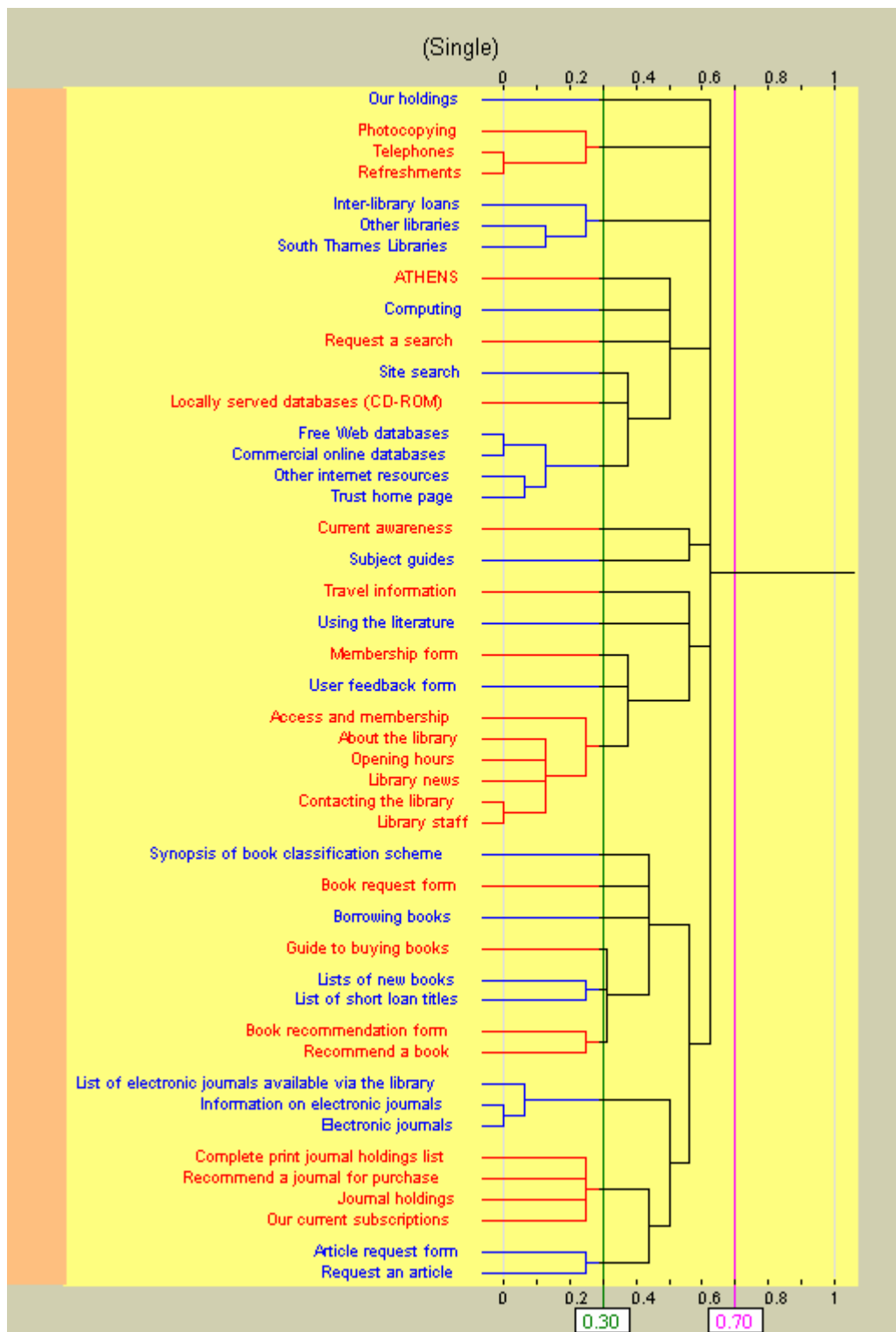
Figure 4. Card sorting test results: "complete"

Figure 5. Card sorting results: "single"

IV.8) Category membership/label intuitiveness test

8.1) Eight completed questionnaires were received. Appendix 6 provides details of the questionnaire.

This test revealed significant lack of clarity around the main category headings "general information" and "facilities for readers". Four respondents expected that "facilities for readers" would include book loans, three mentioned inter-library loans, two mention user support, two mentioned journals, two mentioned Internet access, and one mentioned other libraries within the trust. Under the heading "general information", one respondent mentioned other libraries, two mentioned books and book loans, and one mentioned journals. Both headings evidently tend to be interpreted as referring comprehensively to all aspects of the library service. Three respondents expected "journals" to include information on literature searching.

8.2) Some of the item labels also appeared to be ambiguous or problematic:

a) With "links", three people expected this to cover specifically links to trust sites, three expected it to provide links to other libraries, and one assumed it would lead to basic contact information. One respondent's suggested alternative, "related sites" may be preferable (originally the link had been termed "the Internet"—see Table 2).

b) "Subject guides" led people to expect more general guides to subject information, rather than guides specifically to web-based resources

c) "ATHENS" mystified people who were not familiar with the ATHENS authentication system for databases and journals. Within the last few months I had publicised it heavily within the organisation; however six respondents professed not to know what the term meant, one thought it would lead directly to bibliographic databases, and another assumed it was a Web search engine.

d) People seemed to be unsure of what "current awareness" might refer to; three people professed not to know what it meant, two thought it referred to current events within the trust, another thought it would lead to information about new online services, and another assumed it was a general health news service. "Journal alert" may be a preferable alternative.

e) With "current titles", which refers to journals currently subscribed to, three respondents expected this to include information on new books, and one expected it to lead to a book recommendation form.

f) "Travel information" led two respondents to expect general travel information, rather than just details of how to reach the site.

g) Three people expected "our holdings", which refers to books, to lead to information about journals and other library materials as well.

h) Three respondents highlighted an ambiguity in "recommend a book"; it was interpreted as meaning "recommendations by the library", "reviews", "other readers' recommendations" as well as an invitation to suggest a book for purchase.

i) "Site search" led two respondents to expect a web search facility, rather than a facility for searching the site; this label was actually amended in the course of testing to "search this site".

j) Three people professed not to understand the meaning of "locally served databases (CD-ROM)", and four were evidently unsure of the meaning of "commercial online databases" (by which I had meant services available via an online host).

k) The other significant labelling ambiguity seemed to be occurring with "request a search"; although this actually leads to a search request form for library staff to carry out a mediated search, four people expected this to lead to information on carrying out their own literature searches, or directly to search facilities mounted on the site.

8.3) The test highlighted some expectations for content which are not currently available. Under "book collections and loans", six respondents expected self-service Web OPAC circulation functionality to be available. One expected there to be a facility to search their own inter-library loan records online, while another mentioned the desirability of an integrated union catalogue and inter-library loan request facility. Other possible new content areas mentioned were:

- a brief history of the library
- details of available study space
- information about copyright legislation
- guides to critical appraisal and "levels of evidence"
- contact details for public libraries in South London
- how to reach the library by public transport from main trust sites
- links to map and route planning sites
- pictures of the library staff and information about their job roles

Several participants remarked that this test took them rather a long time. With hindsight it would perhaps have been better to separate the label intuitiveness and category membership aspects of the test.

IV.9) Web log and site search analysis

Activity levels since the site was launched, as recorded by eXTReMe Tracker and FreeFind, have been too low for any significant conclusions to be drawn regarding usage trends. It was not possible to compare them meaningfully with usability test results. FreeFind searches appear to reflect testing activity, or use by a few known individuals for specific searches. According to eXTReMe Tracker, the site is being visited 38 times per week on average, with 68.4% of unique visitors. 53% of visitors are based in the UK; the surprisingly high figure for "US commercial" visitors is accounted for by the use of a US-based URL forwarding service, xiy.net. Microsoft Internet Explorer 5.0 is the most popular browser, followed by Netscape 4.0. The site has been indexed by Yahoo and spidered by the Altavista, Teoma, Google and Excite search engines; a small proportion of visits to the site (not quantified) derives from web search tools.

Given that the eXTReMe Tracker script was inserted only on the introductory page, it cannot provide information about patterns of usage of the site, as distinct from simple hits. The analysis could be developed and elaborated to some extent by adding eXTReMe Tracker to other key pages; however, this would be cumbersome. The best possibility, however, would seem to be to move the site to one of the commercial hosts providing services to the NHS which supplied customers with more detailed web logs.

V. Changes proposed to the site

Changes proposed to the site in consequence of usability testing are listed in Tables 10 and 11. In an attempt to overcome some of the problems of multiple interpretations of menu items, and to incorporate multiple routes to information, the number of cross links provided between pages should be increased (cf. McGillis and Toms 2001, Gullikson et al.1999). Two other significant revisions should be kept under consideration in the short to medium term: 1) possible amalgamation of the print and electronic journal lists, and 2) restructuring of the CD-ROM database information. 1) would involve creating a huge file, given that the list of e-journals is very extensive. In the longer term, it would be preferable to develop a searchable database of journals, ideally a union database of titles available in all libraries serving the trust, rather than a list. 2) would involve either creating an excessively long page which would be tedious to scroll, or else the loss of some detailed information. I would prefer to await the results of carrying out the more minor changes listed before embarking on this. Due to time constraints, it is unlikely that further formal usability testing can be carried out on the site in the near future; however, usability issues will need to be monitored continually in an informal fashion (e.g., via user feedback) as the site develops.

Table 10. **Changes proposed to site as a result of usability testing**

Proposed change	Location	Reference
Navigation/readability		
Amplify "facilities for readers" to include loans, searches, user support and interlending, with hyperlinks to more detailed information; re-name page as "reader services"	*passim*	table 3, 6, 8.1
Revise site organisation and structure (see Table 11)	*passim*	7
Use tables to improve layout of menus	menu files	
Amend labels and page headings to improve intuitiveness: "our holdings" to "our book stock" "links" to "related sites" "commercial online databases" to "fee-based databases" "subject guides" to "web subject guides" "book collections and loans" to "books" "current awareness" to "journal alert" "ATHENS" to "ATHENS accounts" "general information" to "library basics" "request a search" to "search request form" "recommend a book" to "book purchase request" "site search to "search this site"		8, 6 8 8.2 8.2.i), 6 8; 6, task 2 8 8.2.c 8.2.b 8; table 5.1 8.2.j) 8.2.g) 8.2.h)
Standardise terminology: "e-journals" etc.	*passim*	6.1; table 5
Inspect pages for density; ensure sufficient "white space" is included; ensure that hyperlinks are, where avoidable, not situated within blocks of text	*passim*	5.3.i.a)
Clarify information on password protection by colour coding of cell backgrounds in relevant lists	journal and database pages	3, table 4
Remove synopsis of classification scheme	books pages	6, task 9
Incorporate cross links between database pages, journals pages		10
Remove list of current journal subscriptions; insert comments on meaning of holdings information instead; replace terms "holdings", "current subscriptions" where possible	journals pages	6, task 1
Include instructions on how to search alphabetical journal list	journals pages	6, task 1
Resolve navigation anomaly by removing link to article request from journals menu	journals menu/ interlending pages	5.2, table 6
Put location indicators, e.g. "inter-library loans >> article request form" on pages *not* linked to directly from menus	*passim*	table 5
Investigate functionality of site search, amend search hints if necessary	site search	6, task 12

Proposed change	Location	Reference
Revise layout of feedback form	feedback form	4
Convert FreeFind search to no-advertisements version	site search	table 5, task 10
HTML validity		
Standardise HTML version and syntax across site using validation tools (e.g. NetMechanic, TidyGUI)	*passim*	5.3
Provide ALT tags for instances of pdf.gif	files incorporating pdf.gif	5.3.ii.h)
Ensure that page headers, titles and labels are consistent	*passim*	5.2
Provide META tags for all pages	*passim*	5.3.ii.b)
Amend relative references in hyperlinks	*passim*	5.3.ii.g)
Amend tables to use relative widths where possible	*passim*	6.3
Content to be added		
details of available study space	reader services information	8.3
link to new page about copyright (with external links to sources of information)	reader services information	8.3
details of database and web search training	reader services information	8.3
information/links to critical appraisal and "levels of evidence"	using the literature	8.3
links to public library services outside the trust area	other libraries	8.3
details on how to reach the library from main trust sites, links to major map and route planning sites	travel information	8.3
"mugshots", information about job roles and responsibilities	library staff	8.3, table 3
picture of the library (not too big)	intro page	4
lists of web resources on community health issues, professions allied to medicine, specialist topics within mental health	"Catherine's cool sites"	3, table 4
library jargon guide	link from main menu	table 9
update clinical governance resources	"Catherine's cool sites"	3, table 4
Language		
detail about e-journal access problems to be put on a separate page	e-journal information	4
explanation of short loan fines to be clarified; find alternative to phrase "per week or part thereof"	book pages	4

N.B. references are to test results and discussion

Table 11. Proposed new site structure *(N.B. new or revised content in red)*

Search this site	Search this site	
Library jargon	Library jargon	
Library basics		
About the library	About the library	
Library news	Library news	
Opening hours	Opening hours	
Contact	Contact	
Library staff	Library staff	
Who may use us	Who may use us	
		Membership form
Travel information	Travel information	
Library services	Library services	
Books		
Our book stock	Our book stock	
Borrowing books	Borrowing books	
	Short loan collection	
	(New accessions lists)	
	Buying books	
Inter-library loans	Inter-library loans and article requests	
		Book request form
Book purchase request	Book purchase request	
Journals		
Our journal stock	Our journal stock	
		Electronic journals list
		Print journals list
		Recommend a journal for purchase
Electronic journals	Electronic journals	
		Electronic journals list
ATHENS accounts	ATHENS accounts	
Article requests	Inter-library loans and article requests	
		Article request form
Literature searching		
Locally networked databases (CD-ROM)	Locally networked databases (CD-ROM)	
		Guide to CD-ROM databases
		(Search guides)
Fee-based online databases	Fee-based online databases	
		Request a search
Request a search	Request a search	
Free Web databases	Free Web databases	
Journal alerts	Journal alerts	
Using the literature	Using the literature	
Other libraries		
NHS libraries	NHS libraries	
Academic libraries	Academic libraries	
Public libraries	Public libraries	
Professional libraries	Professional libraries	
Related sites		
Web subject guides	Web subject guides	
		("Catherine's cool sites" lists)
Other Internet resources	Other Internet resources	
ATHENS accounts	ATHENS accounts	
Feedback	Feedback form	

VI. Comments and conclusion

Relatively few people were involved in each of these tests. It is a commonplace of the usability testing literature that useful and valid results can be obtained with eight users or less, indeed that 80% of usability problems will become apparent with five users (e.g. Nielsen 2000b, Campbell et al. 1999). This is disputed by Spool (2001) who suggests that large complex web sites are not comparable to the standard software products used in earlier studies, and that usability testing should ideally use 90 users. However, Spool's findings in this study related to e-commerce sites providing sophisticated transaction functionality. At 63 pages, with 112 files, and with limited interactive features (six forms), slamlibrary.xiy.net would normally be considered a small to medium sized and simple site. It also became clear, particularly in the formal observation testing, that later testers were identifying a high proportion of repeat, rather than new, problems. This suggests that, although additional issues would probably have been identified with a larger group of testers, the small sample sizes do not seriously invalidate the results as they stand.

It appeared that I had correctly anticipated the main usability issues (I.4). The major problems encountered by the testers appeared to involve two main areas: a) the specialised terminology used in referring to information sources and services, and b) the organisation and structure of some of the information about library services.

According to France (1998), library users can be characterised as "chronic beginners"; this, he says, is in large part due to their uneven demand for library services, which can involve periods of intense research separated by long gaps. (In my experience this appears particularly true of health service staff, who may seek information intensively over weeks or months for the purposes of course work, job interviews, policy development, research or teaching, and subsequently disappear from the library for lengthy periods, sometimes years!) This presents particular problems of usability for library applications, in that users may combine domain expertise, and serious and sophisticated information needs, with considerable naïveté in information-seeking behaviour.

In a classic study, Chen (1994) delineated the "vocabulary problem" of the mismatch between information retrieval system indexing and users' preferred terminology. Many researchers have highlighted the classification of information systems, and the labelling of resulting categories, as a problem of information design generally and of web information services in particular; a review of the literature is provided by McGillis and Toms (2001). With respect to libraries, a problem has been identified of how librarians should communicate on the Web with people outside the profession, and with an increasing number of remote end-users who may have diverse cultural backgrounds and little previous exposure to academic information seeking (Spivey 2000). According to Spivey, experienced library users become familiar with library jargon, but can be confused by new systems and terminology, (e.g. "Ingenta", "RDN" etc.) or by the availability of multiple platforms and interfaces for a single resource (e.g. MEDLINE), leading to frustration and a sense of helplessness.

Library jargon can include: short descriptions and nouns for library resources and services, e.g. "circulation", "ATHENS"; library acronyms (OPAC, ILL); vendors' trade names (e.g. SilverPlatter, OVID); and what he terms "embedded explanations", such as phrases in apposition, examples or descriptions, category headings, or prepositional phrases. He found that terms such as "reference", "reserves", "indexes", "citations", as well as more obvious jargon such as "proximity operators", "implicit Boolean", "user authentication", were obstacles to readers (cf. Dewey 1999). Naismith and Stein (1989), in their detailed study of student comprehension of technical language used by librarians, found that readers misunderstood library terms in reference interviews and library handouts about 50% of the time. Unsurprisingly, given the rapid changes taking place in the information market, most readers do not have in their minds a clear taxonomy of electronic information sources.

It is thus apparent that too "minimalist" approach to the design and terminology of library sites can sometimes place a high semantic burden on the chosen vocabulary, and run counter to the need for usability and clarity. These authors suggest a continuum of strategies, such as the use of explanatory phrasing, the provision of glossaries etc. that can be employed in written and verbal communication to bridge the gaps in understanding; these have obvious application to library web site design. A library web site needs to be seen in the context of the library's user education and support strategy, and indeed of its "information architecture" as a whole, with appropriate guidance provided to users on identifying appropriate information tools and sources.

Regarding the provision of guides to web resources, I had sought to answer the pressing question, "how much is too much?" According to Sowards (1998), the compilation of web resource guides has become a favourite activity for librarians because they generally perceive it as extending library service functions (selection, endorsement, organisation, and co-operation) into cyberspace. However, it seems to me that there are limits to what one can reasonably include on the web site of a small specialist library (given the plethora of high-quality subject-specific sites in existence, and also the availability of information from "competing" local academic and professional information sources) without undue duplication of effort. Interestingly, the participants in the study seemed, in their use of the web, to be adopting the "anchor strategy" of making regular use of a few, authoritative sites, as observed by Westberg and Miller (1999).

Recent surveys carried out for the JUSTEIS project on provision and use of electronic information systems with higher education in the UK (Armstrong 2000, 2001; Pothen 2001) seem to indicate that academic library web sites are in fact relatively little used (cf. the proportion of users in Table 1a). I would suggest, based on the focus group discussions, that the key role of a library web site in relation to external web-based resources is not only to act as a form of quality filter, but also to provide readers with jumping-off points for their information seeking. The focus group participants emphasised, as well, the value of *local* conten*t* or content of *immediate local relevance*; this appears to me to be an appropriate direction in which to develop the SLAM library site's content.

With apologies to Luther (*ecclesia semper reformanda*), one might say *locus rete semper reficiendus*: a web site is always in need of reconstruction! Usability testing, being limited to what can be readily observed and measured, is necessarily somewhat artificial. It is also limited in the type of questions it can answer; it is unrealistic to expect small-scale usability testing to answer questions about a site's overall quality and effectiveness (Bernstein 2000) or to establish objective standards of usability (McGillis and Toms 2001).

This project identified a number of significant usability problems within the site; it also afforded, to a limited extent, the opportunity of evaluating emendations. The questionnaire and demographic data which was obtained gave indications of existing habits of professional information seeking on the web. Focus group data and testers' comments provided indications of the potential value and usefulness of the site to professional staff within the trust, and yielded many valuable suggestions for improving it and developing it further.

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Appendix 1. Health professionals' access to and use of the Internet

1) In 1998, the consulting firm PSL conducted a worldwide survey of physicians' access and use of the Internet. The first phase of their study found that 80% of physicians across the countries surveyed were either already online or intended to be in the near future, with the predominant place of access being the home. In the second phase of the study, 95% of respondents reported using the Internet to access disease information, 88% reported reading medical journals online, and 85% used it to search for drug information (PSL 1998).

2) Anthony (1997,1998) conducted a qualitative analysis of computer networks within the National Health Service. 61% of trusts possessed a local area network that nurses could access. Only 14% were able to access the Internet. The situation was considerably worse in mental health and community trusts than in acute trusts. He reported poor levels of computer literacy among nursing staff, although they were keen to access networked resources for training, current awareness, research and practice development purposes. They gave priority (in descending order of importance) to accessing databases, online information, electronic journals, and digital libraries via the Web. Respondents were aware of quality issues, and tended to want to use quality assured material from accredited sites. He estimated (Anthony 2000) that around 45% of nurses have access to the Internet at home or via other external sources.

3) Church et al. (1999) carried out a questionnaire survey of access to and usage of computers, access and use of the Internet, and of desirable content in an educational web site, among specialist registrars in the West Midlands. 76% altogether reported having access to the Internet, 46% at work and 30% at home; 24% reported having no access, despite the fact that postgraduate libraries in the region were installing web access at the time (cf. Jordaan and Jones 1999). Their preferred content types included journal reviews, links to quality sites within their speciality, topic reviews, conference information, quiz or problem solving programmes, and crisis scenarios.

4) A questionnaire survey was conducted during 2000 among members of the Royal Society of Medicine to assess their interest and skill level on the Internet. 84% had access either at home or at work. 61% of respondents described themselves as 'confident or fairly confident' about using it, and 50% were confident that they could perform an accurate information search. However only 47% of respondents fulfilled the questionnaire's criteria for web literacy. (Snow 2000, Royal Society of Medicine 2000).

5) Alderman (2000) conducted a survey of Internet access and use among *Nursing Standard* readers from across the UK. 51% reported using the Internet regularly: 26.2% at home, 5.1% at work, and 18% in both places. 37.4% of respondents had no access at work, and 19.9% said they did not know how to use it. 42.3% of respondents described access to the Internet as important or vital to their work. Evidence based practice, research and continuing education were information needs that were mentioned most often. Sites visited most often were the Royal College of Nursing, *Nursing Standard,* Department of Health, and MEDLINE.

6) Moffat et al. (2001) carried out a survey of Internet connectivity and use in Lothian Health Board area among general practitioners. The response indicated a high level of connectivity (92%) within practices. 67% of respondents reported using the Internet, and 54% rated it useful or very useful for work related purposes. Respondents reported the barriers to their using the Web as being: a) lack of time to search for information, b) the problems of doing so effectively, and c) their lack of training in information retrieval skills. Another issue was d) widespread concern about the quality and reliability of the information that is available (cf. e.g. Eysenbach and Diepgen 1998). This led them to make heavy use of a small number of sites that were believed to be authoritative and reliable: eBMJ (www.bmj.com), PubMed MEDLINE, Doctors.net, the BMA site, UKPractice; the Medical Royal Colleges' sites (cf. the earlier findings of Roscoe (1998) on GPs' Internet access and information needs).

7) Aitchison and Miller (2001) conducted a more informal online survey of GPs' favourite web sites, finding a similar pattern of use to Moffat et al.

Appendix 2. Health professionals' information needs and use and the web

Most of the evaluation studies of web-based resources focus on academic contexts (e.g. Armstrong et al. 2000, 2001, Ray and Day 1998). While there is an extensive literature on more detailed aspects of the information behaviour of health scientists and health care providers (much of this is reviewed by Detlefsen, (1998) and by McKnight and Peet (2000), there are relatively few published studies that relate this to use of the World Wide Web, and little coverage specifically of mental health professions:

1) Since 1997 the Swiss-based Health on the Net Foundation (http://www.hon.ch) has carried out yearly surveys among health professionals and patients of Internet use for health information purposes. According to the most recent survey, 83% of respondents felt that accuracy of health information on the internet was an issue, 79% were concerned about its trustworthiness, 76% about the availability of information, and 72% about the difficulty of navigating around and finding information. Health professionals reported the following problems in using the Web: lack of time (60%), dissatisfaction with information quality (26%), inadequate search tools (24%), and inadequate IT training (29%)

2) Farmer and her colleagues (Farmer et al. 1997, Farmer and Richardson 1997) examined the potential of the Internet and other networked information resources to provide access to information for trained nurses working in remote areas. They undertook a survey of information need and use among community nurses working in the Western Isles of Scotland, and conducted experimental workshops for them on Internet searching. Participants in the study were found to have a low awareness of new information resources designed to assist with evidence-based practice, but a high level of interest in the use of the web and of email. The study also identified a significant lack of British web-based resources related to community nursing.

3) Obst (1998) undertook in 1995 a survey of Internet use by German medical professionals (physicians, students and others). A relatively small number of preferred sites were mentioned: MEDLINE, other National Institute of Health databases, the National Library of Medicine (NLM) site, Online Mendelian Inheritance in Man (OMIM), the Center for Disease Control (CDC), and the Virtual Hospital at the University of Iowa. The respondents suggested the following as Internet services that should be provided by libraries: clear presentation of medical resources, introductory courses on Internet information, evaluation of medical Internet resources, databases, OPACs, and inter-library loan services.

4) Palmer (1999) carried out a comprehensive study of information needs and use among community mental health staff in the Bournemouth area. While the respondents had a highly positive view of the Internet, none of them had access to it at their team base; 15% had access at home, but only 9% had used it. This group reported a deficiency of computer skills in general as a barrier to information seeking.

5) Drezner (1998) studied Internet use by doctors treating HIV patients. He found that 65% of his respondents accessed the Internet at least once a week. 16% had used it for online continuing medical education (CME). Regularly updated, state-of-the-art treatment information was the most popular feature of HIV-related sites. Other preferred sites included Physicians Online and the National Library of Medicine (particularly for free MEDLINE)

6) Ward (2000) undertook an online questionnaire survey to determine what nurses, midwives and health visitors in the UK wanted from an Internet service dedicated to their needs. They were invited to rate and comment on the importance of possible content areas. Information for nursing specialities, peer-reviewed articles and bibliographic databases were felt to be the most important areas, while jobs, local information and mailing lists were the least. Many respondents appeared to be unaware of existing services, reflecting perhaps inappropriate organisation or marketing.

7) The VIVOS project (Yeoman et al. 2001) aimed to develop and evaluate methodologies for determining the value and impact of "virtual outreach" information services in the health sector. One of the services analysed was a well-known NHS library web site (Exeter) that I have included in my own evaluation (see below, section IV.1 and Table 3).

8) A similar project, IMPACT, which aims to evaluate the impact on evidence-based practice of nurses and therapists of access to the web, is currently under way at Sheffield University (Harrison et al. 2001).

9) Bawden and Robinson (1997) undertook a comparison of the information behaviour of psychiatric nurses and midwives. They found that psychiatric nurses in general demonstrated a low level of information awareness and computer use in comparison with other nursing specialisms. They were found to need a particularly wide range of information, including material on social services. Information resources in psychiatric nursing, both primary and secondary, were described as relatively poor. (It is interesting, and disturbing, to compare this study with Fakhoury and Wright's (2000) survey of communication and information needs of community mental health nurses across the UK, which nowhere mentions formal information sources!)

Smith (1996) suggests that useful clinical information needs to be "directly relevant, contain valid information, and be accessible with a minimum amount of work". Many writers, e.g. Hersh (1998) have expressed concerns about the value of electronic information systems generally, and the World Wide Web in particular in its current state, as a resource for evidence-based clinical practice. Others, such as Stewart (1999) Graber (1999) and Jadad (Jadad and Gagliardi 1998, Jadad 1999, 2000), while aware of some of the problems (quality of information, time demands of searching) are more positive. Gawande and Bates (2000) summarise some of the commercial and non-commercial efforts to develop internet-based one-stop information services for physicians. Church (1999) suggests, "The ideal scenario is a single site providing links to high quality sites as well as providing a number of other services…"

It is unsurprising, then, that these surveys generally found that doctors in supporting clinical practice tend to locate and make heavy use of a few major, widely recognised sites; what Westberg and Miller (1999) term an "anchor strategy".

Appendix 3. Notes on this site

This is an updated version of the notes accompanying the site as it was submitted in January 2001:

This site has been built largely using Microsoft FrontPage 2000. The use of FrontPage was dictated largely by its adoption by my workplace (the South London and Maudsley NHS Trust) as a development tool for its intranet.

I have had regard to the NHS Identity Guidelines: Web sites (DoH 2000) but have not adhered to them rigorously. The site deviates from them in a number of significant respects: in it use of frames, its use of a non-standard colour for the menus, and its file naming. It attempts to follow them in its use of fonts, of text and of background colour, in providing alt-tags for all graphics, and in the "lean" and utilitarian character of its design.

It primary readership is likely to be local and to consist of NHS clinical staff, although it may attract the attention of general readers searching for mental health information.

1) The *caredata CD search guide* was the result of a project previously undertaken for last year's HTML practical. For the sake of simplicity, I have retained its original file structure; all the files pertaining to it are in the one directory, *caredata CD files*. I have not substantially altered it, hence the difference in style from the rest of the site. The publishers of *caredata CD* do not produce a guide of their own.

2) The *complete journal holdings list* originated from a report in MS Access, which saves as an RTF. It was converted from text to table format using MS Word, The *e-journals list* originated as a large Word document in table format. Both were "cleaned up" using the Clean Up Word Files feature in Dreamweaver, and Programmer's File Editor. It would have been better to be able to create these documents in HTML *ab initio*, and indeed to hold the information in database format rather than as large documents.

3) Other files that started life as Word documents are:

all the book lists (December2000 etc.)
LSW-library-guide.htm
holdings.htm
libraries-accessible-to-SLaM-staff.htm

All have been (very laboriously!) stripped of superfluous Word-related code using Programmer's File Editor and Dreamweaver. It would have been desirable to insert tables of contents in the book lists using anchor tags.

The Arial font is strongly recommended in the NHS identity guidelines, hence I have set it (or Arial and Helvetica as alternatives) the font throughout this site. The guidelines rule out Cascading Style Sheets to do this, which would have reduced file sizes.

I used the freeware tool *HTML Shrinker* (http://pico.i-us.com) on all pages to reduce file sizes. This has had the unfortunate effect of eliminating line breaks

from the coding, stringing it out as a long line. This application also strips out inverted commas from the coding. No warning was given in the accompanying documentation about this, and I apologise in advance for the inconvenience it will cause. I have also run *TidyGUI* (http://perso.wannadoo.fr/ablavier/TidyGUI/) on them.

The *forms* were all produced using FrontPage. Some of them were written using the forms wizard, others not. The site uses the external forms handling service Response-O-Matic (http://www.response-o-matic.com/home.htm).

The site uses an externally hosted site search service, FreeFind (http://www.freefind.com).

A reasonable range of *meta tags* have been included on the frames page, with a view to facilitating its retrieval by the search engines that use meta tags. The "robots" tag has been set to "index, follow". A summary of the site's content has been included in <noframes>, also to facilitate indexing by search engines. No meta tags have been added to the other pages. All pages include a [home] link at the foot so that, should an individual page be retrieved by a search engine, the user can navigate readily to the frameset page. This is in accordance with standard recommendations for making frames-based sites "search-engine-friendly". The site is relatively small, so the need to bookmark individual pages should not be an issue.

All *internal links* seem to be working satisfactorily. I also check all *external links* regularly using the freeware utility Xenu (http://home.snafu.de/tilman/xenulink.html).

The use of *frames*, which seemed to have obvious advantages from the navigational point of view, obviously limits it accessibility to browsers which do not support frames. A descriptive <noframes> page links to a printable version of the library guide (this also originated from a project undertaken for last year's practicals). I have used the Browserola browser emulator, as recommended by the STLIS webmaster, to test the appearance of the site. It appears to work satisfactorily in emulations of Internet Explorer version 2.0 upwards and Netscape 3.0 upwards.

Catherine Ebenezer

January 2001

Appendix 4. Focus group script

The SLAM library Web site originated as an M.Sc. project. It is intended to act both as a *gateway to the library's services,* enhancing the accessibility and usefulness of library services to staff, and to *enhance generally the provision of mental health information* in accordance with the requirements of "clinical governance". It can be seen that the site needs to accommodate both novice and advanced users.

_____

Have you used the site?
If so, what for?
What was your preliminary impression of it?
Would you use it again?

Is the site:

- readily intelligible, i.e. not confusing to the reader?
- intuitive and easy to navigate (with respect to overall structure, navigation, labelling, searching/browsing, general features)?
- visually attractive?
- consistent in its design and presentation?

Are the readers able readily to locate information about library services?

Does the way in which information about library resources is presented accord with the reader's "mental maps"? In particular, is the division clear between locally served and web-based resources? Have you any other ideas for categorising library resources?

Are the readers readily able to locate through it the sources of mental health information they need? Is its scope and content, as far as is possible, adequate to the needs of trust staff? If you think it needs be developed further, have you any ideas for what should be included?

How important do you think it is it that library web sites provide a "one-stop shop" for selected Web resources? Do you think the lists of web-based resources on the SLAM library web site duplicate what is available elsewhere?

Appendix 3. Library staff / webmaster questionnaire

Participant:……………………………

Date:…………………………………

1. Is there information that you think should be on the Landor Road library web pages that is not there? If so, please specify:

2. Is there information currently on the Landor Road library web site that you feel is not needed? If so, please specify:

3. What is the best feature of the Landor Road library web site?

4. What is the worst feature of the Landor Road library web site?

5. If you could change one thing about the site, what would it be?

6. What information do you think should be available within two clicks of   the home page?

7. Circle the number that best describes your experiences so far with the Landor Road library web site:

   1= I can never find what I need   6= I can always find what I need

   1   2   3   4   5   6

8. Circle the number that best describes your experiences so far in advising readers where to find things on the library's web site:

   1= It is very difficult to explain where to find things
   6= It is very easy to explain where to find things

   1   2   3   4   5   6

9. When accessing the information that you use most frequently, does it:

   1= take just the right number of steps to find it
   4= take too many to find it

   1   2   3   4

Appendix 4. Usability study task list

Scenario: you are a member of trust staff who wishes to make full use of the information provided by the Landor Road library.

The following search tasks are not intended to test your own abilities as a searcher, but the organisation, content and design of the library Web site itself. Observing closely how you carry them out will help us refine and improve it. If you get stuck at any stage, please assume the problem is with the site, not with you!

Please:

- *Think aloud* to the evaluator as you perform the tasks
- Verbally indicate when you have completed each one
- Stop and wait for further instructions

---

1 Find out whether the library holds: the *Journal of Child Psychotherapy,* the *Irish Journal of Psychological Medicine,* and the *International Journal of Social Psychiatry.* Is electronic access to any of them available via NHSnet on trust premises?

2. Find a list of links to evidence-based mental health sites.

3. You have discovered that the library does not hold the journal that contains an article you need. Find the online form that you can use to request a copy of the article from the library.

4. What databases does the library provide access to via its CD-ROM network? Which database is on a trial subscription? Which databases have search guides available to print or download?

5. Find the page that provides information about ATHENS accounts. Are they available to staff who are not currently affiliated to or studying at an institution of higher education?

6. Which libraries may be used by staff of SLAM?

7. What academic and professional qualifications does the part-time library assistant hold?

8. Is electronic access to *Current Opinion in Psychiatry* available outside the trust?

9. How would you approach the task of finding out whether the library holds a particular book?

 You are looking for information on aspects of psychiatric rehabilitation and decide that you need to search the *Allied and Alternative Medicine* (AMED) database. In what form does the library provide access to this? Would you be able to search it yourself?

Please:

- *Think aloud* to the evaluator as you perform the tasks
- Verbally indicate when you have completed each one
- Stop and wait for further instructions

10. A journal to which you are submitting an article requires that you use the Vancouver system for referencing your citations. Where can you find information about the Vancouver system?

11. Can readers use their own laptop computers within the library?

12. What access to library services is available to patients, carers, and members of the general public?

13. Which bus passes the site entrance?

14. You have a complex search to carry out, you are uncertain of your bibliographic database searching skills, and in any case you have no time to get to the library. Find the form that will enable you to submit a literature search request to the library.

This is the end of the evaluation.

Thank you for your help!

Catherine Ebenezer
June 2001

Appendix 5. Card sorting test script

Thank you for volunteering to participate in this test.

The object of it is to test how intuitive and easy to navigate the library web site is, in terms of the grouping and organisation of the information it contains. Librarians have a notorious habit of presenting information resources in a very librarian-centred way, whereas you, the readers, have other ideas!

You will find in your envelope:

1. Lots of paper slips (sorry, it should have been cards, but this wasn't practicable in the event), each with the designations on them of items of information in the library web site, or candidate terms for categorising them.

2. Blank paper slips for you to write on

3. A packet of paper clips

4. A screening questionnaire; please fill this in and return it with your sorted slips

For the test, you will need a *large, uncluttered* table that is situated well away from draughts and fans.

I suggest you spread out the slips, and *then categorise them in the way that seems most appropriate to you,* using the candidate terms that are provided within the collection of slips, using the blank slips to write down names of your own, or a combination of both.

E. g. if you had slips that said:
> *Audio*
> *tapes*
> *Videos*
> *Music CDs*
> *Books*
> *Children's fiction*
> *Children's non fiction*
> *Romantic fiction*
> *Audio-visual material*

you might want to group them as follows:

> **Books**
> > *Children's fiction*
> > *Children's non-fiction*
> > *Romantic fiction*
> **Audio-visual material**
> > *Music CDs*
> > *Audio tapes Videos*

When you have organised them in the way you think fits best, clip each category of slips together with its heading. Please then return the categorised slips to me in the envelope, with the *screening questionnaire* and any *comment or explanation* you may wish to offer.

N.B. I am a fallible creature—not the most accurate person at manual collating-hence:

1. You may find that the slip 'free web databases' is missing in one of the packs. If you cannot find it in your pack, can you please write out this term and include it in the test.

2. If you find any slips duplicated, please ignore the duplicate; do not use the same one twice

If anything in the instructions is obscure, please contact me for clarification.

Please return the completed exit questionnaire with your paper slips.

_____

Thank you again for helping me with my M.Sc. research.

Catherine Ebenezer
Multidisciplinary Library
SLaM
108 Landor Road Stockwell London SW9 9NT

020 7411 6164

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Appendix 6. Label intuitiveness test/category membership test

The object of label intuitiveness testing is to find out whether labels for items on a web site correspond with what the users expect. Category membership testing has a related function, which is to indicate what information users think belongs in each main category within a site.

PLEASE FILL IN THE QUESTIONNAIRE, completing the questions in the order they are presented, AND RETURN IT TO:

**Catherine Ebenezer, Multidisciplinary Library,
Reay House, 108 Landor Road**

Participant's name…………………………………………………………………………
_____

1: "Facilities"

Please list the kind of material/information you would expect to find if you clicked on the ***Facilities for readers*** link and the link ***Links*** in the picture below. Guessing is both permitted and expected.

Please rate each item with *how confident you feel about each of your responses*, on a scale 1=not at all sure 4=very sure.

Example: if you were rating ***Journals***, you might want to list:
current titles   4   photocopying   3 inter-library loans 2

I would expect *Facilities for readers* to take me to/give me information on:

Instead of *Facilities for readers*, what else might you call/label this?

I would expect *Links* to take me to/give me information on:

Instead of *Links*, what else might you call/label this?

2: "Links"

Please list the kind of material/information you would expect to find if you clicked on *each of the links* under **Links**, and under **Book collections and loans**, in the picture below. Guessing is both permitted and expected.

Please rate each item with *how confident you feel about each of your responses*, on a scale 1=not at all sure 4=very sure.

Example: if you were rating **Journals**, you might want to list:
current titles   4
photocopying   3
inter-library loans 2

If you feel that the label given is inappropriate, please suggest an alternative.

I would expect **Subject guides** to take me to/give me information on:

Instead of **Subject guides**, what else might you call/label this?

I would expect **Other Internet resources** to take me to/give me information on:

Instead of **Other Internet resources**, what else might you call/label this?

I would expect **ATHENS** to take me to/give me information on:

Instead of **ATHENS**, what else might you call/label this?

I would expect **Book collections and loans** to take me to/give me information on:

Instead of **Book collections and loans**, what else might you call/label this?

3: "Journals"

Please list the kind of material/information you would expect to find if you clicked on the **Current awareness** link and *each of the links* under **Journals** in the picture below. Guessing is both permitted and expected.

Please rate each item with *how confident you feel about each of your responses*, on a scale 1=not at all sure 4=very sure.

Example: if you were rating **Facilities**, you might want to list:
photocopying   4
computer use   3
canteen opening hours 2

I would expect **Current awareness** to take me to/give me information on:

Instead of **Current awareness**, what else might you call/label this?

I would expect **Current titles** to take me to/give me information on:

Instead of *Current titles*, what else might you call/label this?

I would expect *Journal holdings* to take me to/give me information on:

Instead of *Journal holdings*, what else might you call/label this?

I would expect *Electronic journals* to take me to/give me information on:

Instead of *Electronic journals*, what else might you call/label this?

I would expect *Request an article* to take me to/give me information on:

Instead of *Request an article*, what else might you call/label this?

I would expect *Photocopying* to take me to/give me information on:

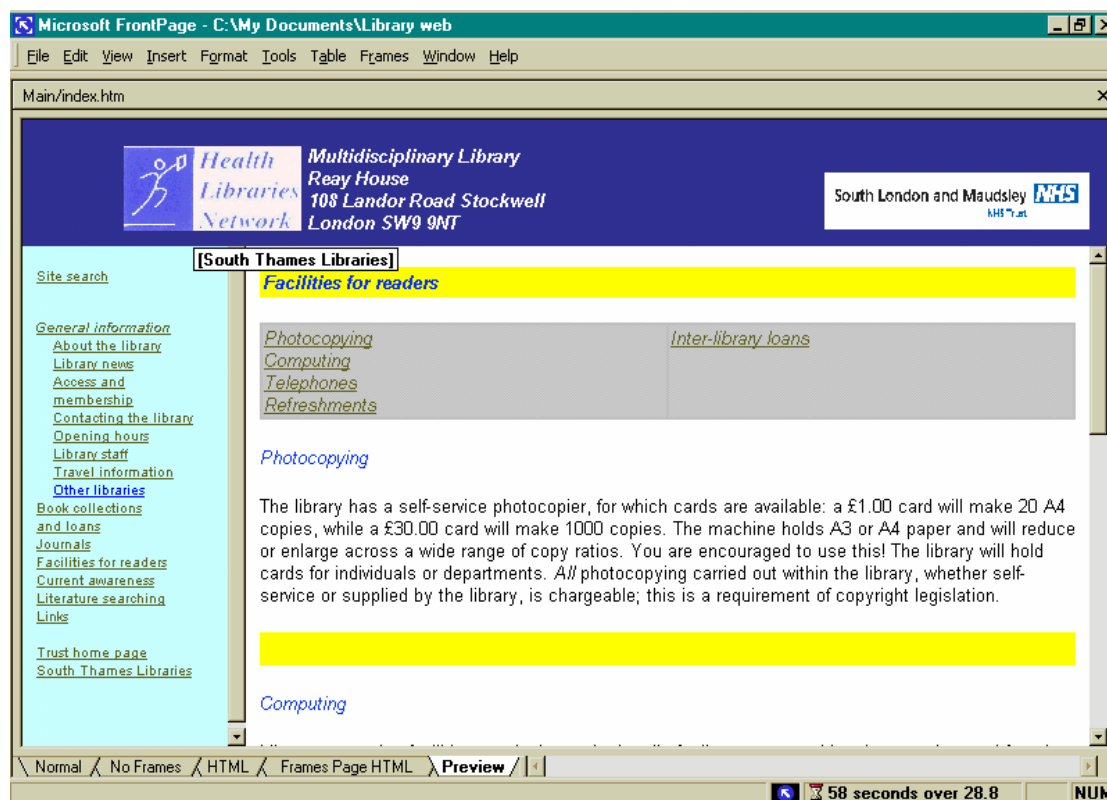Instead of *Photocopying*, what else might you call/label this?

4: "General information"

Please list the kind of material/information you would expect to find if you clicked on the ***Journals*** link and *each of the links* under ***General information*** in the picture below. Guessing is both permitted and expected.

Please rate each item with *how confident you feel about each of your responses*, on a scale 1=not at all sure 4=very sure.

Example: if you were rating ***Facilities***, you might want to list:
photocopying   4
computer use   3
canteen opening hours 2

I would expect ***Journals*** to take me to/give me information on:

Instead of ***Journals***, what else might you call/label this?

I would expect ***About the library*** to take me to/give me information on:

Instead of *About the library*, what else might you call/label this?

I would expect *Library news* to take me to/give me information on:

Instead of *Library news*, what else might you call/label this?

I would expect *Contacting the library* to take me to/give me information on:

Instead of *Contacting the library*, what else might you call/label this?

I would expect *Access and membership* to take me to/give me information on:

Instead of *Access and membership*, what else might you call/label this?

I would expect *Opening hours* to take me to/give me information on:

Instead of *Opening hours*, what else might you call/label this?

I would expect *Library staff* to take me to/give me information on:

Instead of *Library staff*, what else might you call/label this?

I would expect *Travel information* to take me to/give me information on:

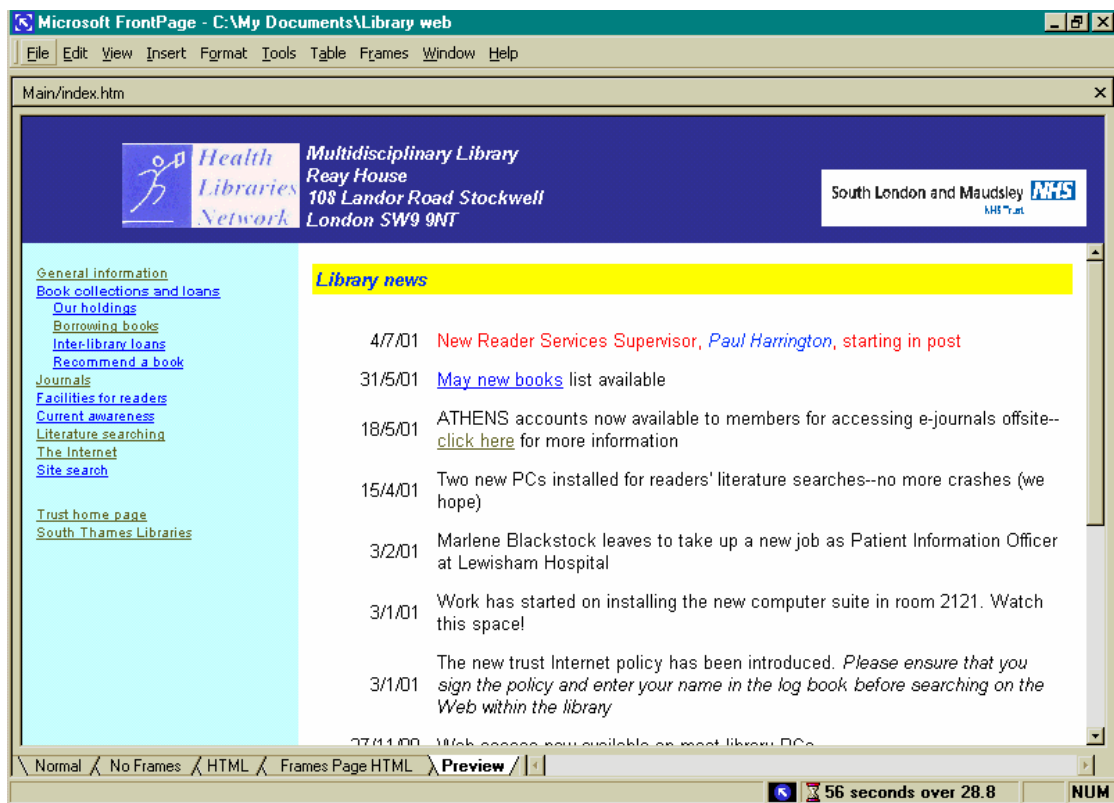Instead of *Travel information*, what else might you call/label this?

5: "Book collections and loans"

Please list the kind of material/information you would expect to find if you clicked on the **General information** link, the **Literature searching** link and *each of the links* under **Book collections and loans** in the picture below. Guessing is both permitted and expected.

Please rate each item with *how confident you feel about each of your responses*, on a scale 1=not at all sure 4=very sure.

Example: if you were rating **Journals**, you might want to list:
current titles   4
photocopying   3
inter-library loans 2

I would expect **General information** to take me to/give me information on:

Instead of **General information**, what else might you call/label this?

I would expect *Literature searching* to take me to/give me information on:

Instead of *Literature searching*, what else might you call/label this?

I would expect *Our holdings* to take me to/give me information on:

Instead of *Our holdings*, what else might you call/label this?

I would expect *Borrowing books* to take me to/give me information on:

Instead of *Borrowing books*, what else might you call/label this?

I would expect *Inter-library loans* to take me to/give me information on:

Instead of *Inter-library loans*, what else might you call/label this?

I would expect *Recommend a book* to take me to/give me information on:

Instead of *Recommend a book*, what else might you call/label this?
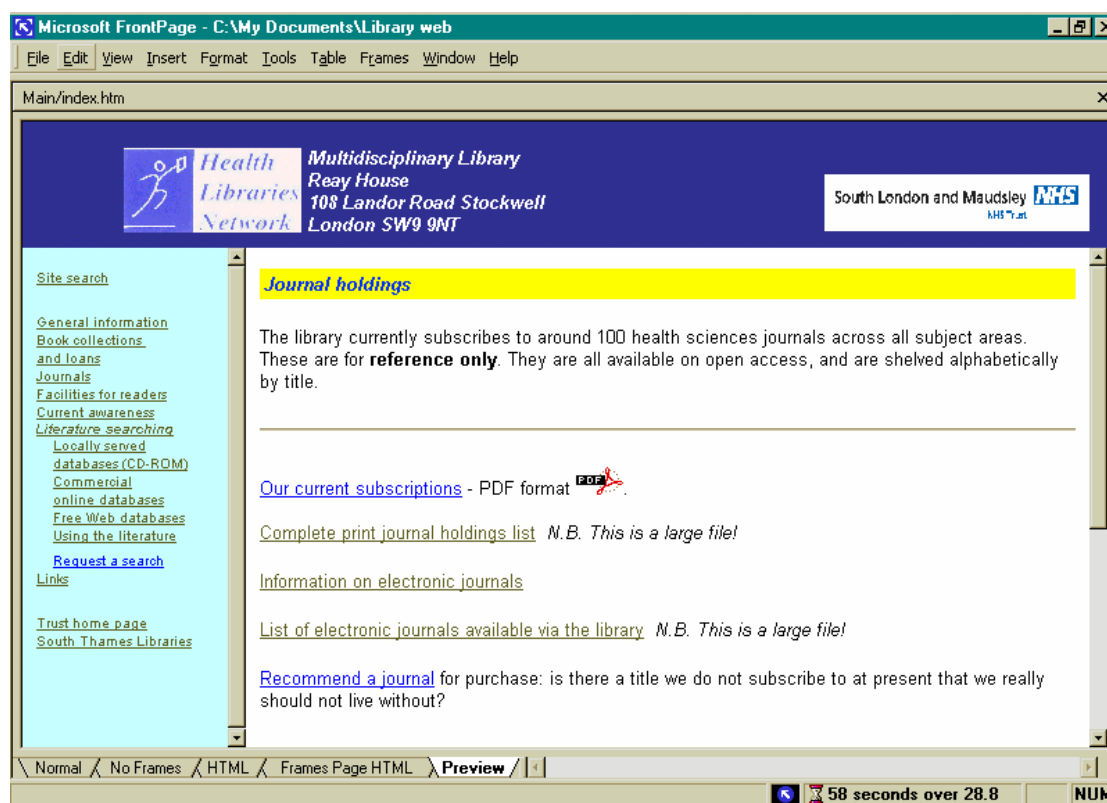
6. "Literature searching"

Please list the kind of material/information you would expect to find if you clicked on the **Site search, Trust home page and South Thames Libraries** link and *each of the links* under **Literature searching** in the picture below. Guessing is both permitted and expected.

Please rate each item with *how confident you feel about each of your responses*, on a scale 1=not at all sure 4=very sure.

Example: if you were rating **Facilities**, you might want to list:
photocopying   4
computer use   3
canteen opening hours 2

I would expect **Site search** to take me to/give me information on:

Instead of **Site search**, what else might you call/label this?

I would expect *Trust home page* to take me to/give me information on:

Instead of *Trust home page*, what else might you call/label this?

I would expect *South Thames Libraries* to take me to/give me information on:

Instead of *South Thames Libraries*, what else might you call/label this?

I would expect *Locally served databases (CD-ROM)* to take me to/give me information on:

Instead of *Locally served databases (CD-ROM)*, what else might you call/label this?

I would expect *Commercial online databases* to take me to/give me information on:

Instead of *Commercial online databases*, what else might you call/label this?

I would expect *Using the literature* to take me to/give me information on:

Instead of *Using the literature,* what else might you call/label this?

I would expect *Request a search* to take me to/give me information on:

Instead of *Request a search,* what else might you call/label this?

Thank you for participating in the test. Your help is much appreciated.

Catherine Ebenezer
Librarian
SLAM, 108 Landor Road