# Library and information resources and users of digital resources in the humanities

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## Abstract

Research paper

## Purpose

This article discusses the results of the Log Analysis of Internet Resources in the Arts and Humanities (LAIRAH) study. It concentrates upon the use and importance of information resources, physical research centres and digital finding aids in scholarly research.

## Methodology

Results are presented of web server log analysis of portals for humanities scholars: the Arts and Humanities Data Service (AHDS) website and Humbul Humanities Hub. These are used to determine which resources were accessed most often, or seldom. Questionnaire data about perceptions of digital resource use were also gathered.

## Findings

Information resources such as libraries, archives museums and research centres, and the web pages that provide information about them are vital for humanities scholars. The university library website was considered the most important resource, even compared to Google. Secondary finding aids and reference resources are considered more important than primary research resources, especially those produced by other scholars, whose output is less trusted than publications produced by commercial organisations, libraries, archives and museums.

**Practical implications**

Digital resources have not replaced physical information resources and the people who staff them, thus both types of information continue to require funding. Scholars trust the judgment of information professionals, who therefore need to be trained to evaluate and recommend specialist digital research resources.

**Originality/value**

LAIRAH was the first research project to use quantitative data to investigate resource use. Findings about the type of resources used are based on evidence rather than opinions alone. This gives a clearer picture of usage which may be used to plan future information services.

**Keywords**

Digital resources humanities, Digital libraries, Information resources, Log analysis, Libraries, Information resources

**Word length**: 9,100

## 1. Introduction

In 2005 Bangor University decided that it could dispense with eight of its subject librarians because, in the age of Google, and when budgets were threatened, they thought it difficult to justify funding intermediaries to help library users to find resources for their work (Curtis, 2005). This action seemed extreme, but follows a pervasive train of thought in the world of digital information to its logical extent, that is, if vast amounts of information are available on the web then what is the use of information specialists?

Once the impact of the internet began to be felt in the mid 1990s a number of writers felt compelled to ask whether the reference librarian, no longer needed to search information systems such as Dialog (http://www.dialog.com) on behalf of the user, still had a role (Cronin, 1998; Fourie, 1999; Gellman, 1996). In the recent RIN and CURL report on researchers' use of academic libraries, the role of intermediary is not

mentioned as a potential future role for librarians. Yet this research shows that librarians still do perform a very wide range of activities that might be described as intermediation, in terms of advising users, whether informally or through training courses, on issues to do with creating, using and curating digital resources, as well as more traditional topics, such as IPR and citation. (Jubb and Green, 2007, section 8) Despite the lack of robust evidence to support it, there is also a pervasive view, in the commercial as well as the information sector, that technology ought in some ways make people more productive and thus save money (Lin and Shao, 2006). By extension therefore it may appear that with increased investment in digital resources it might be possible to spend less on physical libraries and archives, and the personnel that staff them, as the example above demonstrates.

The following article provides evidence from the Log Analysis of Internet Resources in the Arts and Humanities (LAIRAH) research project, which challenges such views. Our study of the use of digital resources by humanities scholars has provided strong evidence of the continuing importance of both physical and digital information resources. Using a quantitative evidence base we argue for the importance of information institutions and the librarians, archivists and information professionals who staff them in order to facilitate resource discovery and quality assurance, even in what Crane (2006) has described as the age of million book digitisation projects.

## 2. The LAIRAH project

The LAIRAH project (http://www.ucl.ac.uk/slais/research/circah/lairah/), based at the School of Library Archive and Information Studies (SLAIS) at University College London (UCL), was a 15-month study undertaken between June 2005 and September 2006 to discover what influences the long-term sustainability and use of digital resources in the humanities through the analysis and evaluation of real-time use. It was funded by the Arts and Humanities Research Council (AHRC) ICT Strategy Projects Scheme, (http://www.ahrcict.rdg.ac.uk/) which reports to the AHRC's strategic review of all ICT related activity. The findings of the research should therefore have an impact of the future funding policy at least of one major UK funding body. It is therefore to be hoped that our work on the importance of

information resources should influence decisions made about their financial future. It is also important since the AHRC is the body that helps to fund the training of future librarians and archivists, through bursaries for study at masters' level at UK universities.

The project's research objectives were as follows:

- to determine the scale of the use of digital resources in the humanities, using deep log analysis of the Humbul Humanities Hub, the Artifact Hub and the Arts and Humanities Data Service portal sites.
- to determine whether resources that are used share any common characteristics.
- to highlight areas of good practice, and aspects of project design that might be improved to aid greater use and sustainability.

During the project the Humbul Humanities Hub and Artifact merged to become the Intute: Arts and Humanities service (http://www.intute.ac.uk/artsandhumanities/).

## 3. Previous work in the area

### *3.1 Humanities information seeking*

Useful recent work on the information needs and information seeking behaviour of humanities scholars has been done by Barrett (2005), Talja and Maula (2003), Green (2000), Herman (2001) and Ellis and Oldman, (2005). Seminal work done by Stone (1982) and Watson Boone (1994) showed that humanities users need a wide range of resources, in terms of their age and type. This remains true in a digital environment, where humanities users continue to need printed materials, or even manuscripts as well as electronic resources, which by their nature may imply a much greater range of materials than those used by scientists (British Academy, 2005). Bates (1996) has analysed the activities carried out by humanist scholars in digital environments, using the Dialog system, which predated the web. The complex command line queries necessary to interrogate the system were difficult for individual users to perform

without training, and thus were usually carried out by information professionals. The experience of searching the web is therefore a very different one from the kind that Bates describes, since it uses a graphical user interface and little or no intervention from an information professional is required before users can begin searching.

A major theme of the literature about humanities users is that they are not like those in the sciences or social sciences, although many designers of electronic resources have assumed that they are (Bates, 2002). Humanities scholars are much more likely to use what Ellis has called 'chaining', and proceed by following references that they have found in other literature (Ellis and Oldman, 2005). Yet this is at odds with keyword queries that tend to be the norm for information systems, and has therefore been seen as evidence that humanities researchers' techniques are somehow impoverished (Chu, 1999). As long ago as the mid 1980s Wiberley showed that humanities scholars constructed searches using well defined terms, but these terms were different from those used by scientists, being more likely, for example, to include names of places or people (Wiberley, 1983; Wiberley, 1988).

Lehmann & Renfro (1991) and Wiberley (2000) suggest that humanities scholars are receptive to technology as long as it demonstrates adequate savings in time or effort. Bates' work and that of Dalton and Charnigo (2004) and Whitmire (2002) has also shown that those humanities scholars who use digital resources tend to be demanding of the quality of resources and are capable of constructing complex search strategies, given appropriate training.

Most recently there has been a move to study the work of researchers in specific disciplines, Talja and Maula (2003), and Ellis and Oldman, (2005) have studied literary researcher, and Dalton and Charnigo, (2004) Anderson (2004) and Duff and her colleagues those in History. (Duff and Cherry, 2001) (Duff et al., 2004) These authors argue that the information behaviour of scholars in individual disciples is sufficiently different that it ought to be a discrete object of study, and that to study the humanities in general risks over generalisation. However, we followed the methodology of the most recent survey, conducted by the British Academy (discussed below) which addressed the broad range of humanities subjects. We also chose a wide sample of different disciplines, as a way of gaining a broad picture of humanities

usage in a relatively short time. However, if further research is funded, we intend to perform more targeted research, concentrating on historical studies and English literature.

### *3.2 Reports on humanities use of ICT*

Since 2005 the UK funding bodies for research in the arts and humanities have also sought to survey the state of needs and usage of digital resources in the humanities. The British Academy (2005) survey of research in both the arts and humanities and social sciences concluded that good use was being made of a wide variety of digital resources by scholars. The sample for the study was relatively small, and tended to be biased towards more senior scholars both in terms of age and job title (the sample contained a large number of professors). It is notable that despite the belief that technological enthusiasm is a function of relative youth, the report found that digital resources were used widely by their sample. The authors argue that for the foreseeable future research resources will remain both print-based and digital, and that therefore some of the most valuable digital resources are those, such as library catalogues, that may be used to locate other resources in whatever format. The report therefore argues that these secondary resources should be the priority for digitisation.

At the same time as the LAIRAH research, three other projects had been commissioned by the AHRC to gather knowledge about the use of ICT resources in the humanities:

- Research in Portals in the Arts and Humanities (RePAH) project based at Sheffield University from August 2005-September 2006 (http://repah.dmu.ac.uk)
- Peer review and analysis of digital resources for the arts and humanities conducted by the Institute of Historical Research (IHR) from October 2005 – September 2006 (http://www.history.ac.uk/digit/peer/index.html).
- Gathering Evidence: Current ICT use and future needs for arts and humanities research, at Bristol University late 2005- September 2006 (http://www.ilrt.bris.ac.uk/projects/project?search=AHRC-ICT).

All of these projects shared knowledge, and compared data. Thus the results that we present below make specific comparisons to these projects' results, and those of the survey conducted by the British Academy in 2005.

All three of the ICT Strategy reports found widespread enthusiasm for digital resource use, however again the samples are somewhat biased. Data collection in all cases was by means of questionnaires and focus groups, and participants were recruited via websites or e-mail discussion lists. This may mean participants are likely to be enthusiasts for digital resources (Huxley et al., 2007: p.19). The Gathering Evidence project found similar enthusiasm for finding aids, however, its participants also used online primary resources such as electronic texts. Like the RePAH project, they also found that participants would have liked access to more primary resource collections in digital form. RePAH also argue that the typical humanities scholar is not willing to expend time and effort to learn how to use new computational tools (Brown et al., 2007: p.8) and it is evident from the Gathering Evidence report that the use made of digital resources is still at a relatively unsophisticated level. Although scholars describe the effect of ICT on their research as transformative, the activities they outline include broader access to e-journal material, the ability to publish material on the departmental website, and more convenient remote access to large collections of digitised material such as Early English Books Online (Huxley et al. 2007, p.7). Such activities may not sound revolutionary to specialists in computing resources, but they are obviously highly valued by scholars.

The IHR project however, found widespread concern about how the scholarly value of ‘born digital’ resources should be assessed- and hence support for the development of some kind of peer review (IHR, 2006). This need is supported by the findings of a recent report from the Modern Language Association (MLA) of America (MLA, 2007) which found a widespread lack of experience in many academics in the assessment of the scholarly value of digital materials, 40% even reported that they were unaware of how to gauge the value of a peer reviewed article in electronic form.

The literature therefore shows that scholars have adopted very broadly defined digital resources with apparent enthusiasm. Yet materials are used in a conservative manner, and there is unwillingness to engage with the scholarly value of new, digital

publications, or to learn new techniques. We are not aware, however, of any literature that has used quantitative methods, particularly deep log analysis (described below), to measure the levels of use of digital humanities resources. Our research also concentrates not on the generality of resources, but on the question of what *kind* of digital resource is most useful for researchers. Although this has been approached by other projects, evidence has been entirely self-reported. Our research is also the first study which has enabled a comparison of the preferences that users report to quantitative evidence of what they actually use.

## 4. Methods

The LAIRAH research used a mixture of quantitative and qualitative techniques. For the purposes of this paper we will concentrate on results derived from two quantitative measures, deep log analysis and a questionnaire. In a further phase of the research we also carried out two workshops and conducted interviews with the producers of digital resources.

### *4.1 Deep log analysis*

We used deep log analysis to assess use levels of digital resources in the arts and humanities. This technique has been used extensively by the Centre for Information Behaviour and the Evaluation of Research (CIBER) at UCL SLAIS (http://www.ucl.ac.uk/ciber/ciber.php) in other areas such as health information and commercial publishing, (for example Huntington et al., 2002). This allowed us to identify patterns in usage of digital resources in the humanities, and identify a selection of used and non-used resources.

All digital information platforms have a facility to generate logs that provide an automatic, real-time record of use. They represent the digital information footprints of the users and, by analysing them, it is possible to track their information-seeking behaviour.

When enhanced, logs can tell us about the kinds of people that use the services. The attraction of logs is that they provide abundant and fairly robust evidence of use. Logs record use by everyone who engages with the system, thus it is possible to monitor the behaviour of millions of people around the world. They not only have an

unparalleled size and reach, but are a direct and immediately available record of what people have done: not what they say they might, or would, do; not what they were prompted to say, not what they thought they did. The data are unfiltered and represent the users' behaviour and complement important contextual data obtained by engaging with real users and exploring their experiences and concerns.

Server log data are records of actual web pages viewed. These records occur as a result of requests made by the client's computer and provide a record of pages delivered from the web server to the client's computer. The server records the internet address of the client's computer. These addresses follow an Internet Protocol (IP number) and relate to registered domain name server (DNS) information. The DNS information gives information such as organisation name, organisation type (i.e. academic or commercial) and country registration. Below is an excerpt from a log file:

```
66.XXX.XXX.XX - - [24/Feb/2005:00:07:12 +0000] "GET /deposit/depintro.htm
HTTP/1.1" 200 318 "http://ahds.ac.uk/copyrightfaq.htm"
```

- (66.XXX.XXX.XX) is the IP address (X represents a number which has been removed for anonymisation purposes). This is an anonymous machine-to-machine address number used by computers to send and receive data correctly over the internet. In the original log files the Xs are of course replaced by numbers, which can be used to identify individual machines. These addresses were used for our analysis, but have subsequently been removed, so that no machine may be identified from published results.
- (24/Feb/2005:00:07:12 +0000) is a date stamp and records the date and time of the file sent in response to the client's request.
- (GET /deposit/depintro.htm) records the file sent to the client and the directories where the file is stored on the server.
- (HTTP/1.1) is the record of the hypertext version communication between server and client.
- (200) is the status field and states if the request was correct and a file was sent
- (318) records the size in bytes of the file sent.

- (http://ahds.ac.uk/copyrightfaq.htm) is the referrer log and states the address of the last site visited by the client.

The information is stored as an ASCII text file in a compressed format. For this study the archived Humbul logs took up about 150MB or about 20% of a compact disk. Neither the DNS address information, nor can the IP number records be used to identify the actual user (Albitz and Liu, 2006). To preserve anonymity further the logs that we analysed were purged of any personalisation data.

We used the logs from the three main portals for digital humanities in the UK:

- AHDS
- Humbul Humanities Hub
- Artifact.

In the case of the AHDS and Humbul we were able to analyse a year's worth of data, using the SPSS software package. However, in the case of Artifact much less was available, due to the fact that the providers of this service did not have the technical support to maintain their own logs. The data from Artifact became available when it merged with Humbul, but we had only three-months' worth and it appeared relatively late in the project's life. For the purposes of this article therefore, we will concentrate on results from the Humbul and AHDS logs. Ideally we would have liked to use logs from the servers of individual digital humanities projects. However, gathering log data even from the three portal sites was a time-consuming process, and to do so from individual projects would have been unworkable given our deadlines.

4. 1. 1 Limitations of the method

Log data does have its limitations. Although they can indicate what country the user is accessing the site from, whether they are using a commercial internet service provider (ISP), or come from an academic institution, such data may be misleading. The logs suggested that an unusually large number of our users were from the USA, yet the questionnaire data told us that only 15% of users were non-UK based. This is partly because many commercial UK ISPs such as BT Internet are registered in America. This is partly why we always use questionnaires as a comparator to log data.

It is also impossible to identify a student or academic working from home, since they are likely to make the connection to university digital resources using a commercial ISP. We are also aware that university machines may be in public access cluster, and so used by multiple users. We therefore had to make a judgement about when users sessions ended, based on periods on inactivity between sessions of use, but could not be certain that the same user had not returned after a coffee break for example. This is less significant for our research, however, since we were tracking trends across large amounts of user data, rather than trying to follow a given individual's route through a digital resource in this instance.

Finally logs can tell us which pages are accessed, but not whether they were actually read or if a user was satisfied with what they found. It was for this reason that we carried out further qualitative research on the opinions that humanities scholars have about digital resources. (Warwick et al, 2008 forthcoming) It is also likely that users may behave differently if they access a resource directly through Google than if they use a portal site. This hypothesis will be tested in the second stage of our research, if it is funded.

### *4.2 Questionnaire*

As a comparison with the log data we also mounted a questionnaire on the AHDS and Humbul websites, and on that of the RePAH project, in which we asked about use patterns of resources. This is a method that has been used repeatedly by the CIBER research team, since their experience has shown that there may be a difference between the resources that users report having visited and the behaviour found in the log files. As Harley and Henke (2007) also argue the use of both log analysis and online questionnaires allows researchers to gain as broad a picture as possible of the use of websites.

Our method was therefore different from that of other surveys, such as the Gathering Evidence Project, discussed above. We did not set out to publicise the questionnaire,

not did we aim for a representative sample of the UK population of humanities scholars. We simply wished to compare the log data for the sites studied with what users thought they were doing on such sites, and their opinions about them. Those who completed the questionnaire on the RePAH site are likely to have been people who had seen conference presentations by the project, or had otherwise heard of it. It is likely therefore that the questionnaire data over-represents the views of those interested in the use of digital resources, and of information professionals, since they had already found such portal sites. However, gaining a truly representative sample of academic use of digital resources in the humanities is difficult, since those who are interested enough to fill in any kind of survey tend always to be the digital enthusiasts. Nevertheless all participants were asked to identify their status as undergraduate, postgraduates, academics, information professionals or interested amateurs, so that we could gain a sense of how typical of the general population our responses might be.

To gain as thorough a picture as possible it is therefore important to compare the data from both methods of collection, logs and questionnaires. Additionally we have compared our findings to those collected by questionnaire mounted on by the IHR and Bristol University ICT projects.

**5. Findings**

Absolute usage levels of the resources were unexpectedly hard to gauge. The period of our research coincided with major changes in the way that all the portal sites functioned, with Humbul and Artifact merging to become the Intute Arts and Humanities service, and the AHDS becoming more centralised. It also made major changes in its central website functionality, allowing users to link to resources themselves and not simply metadata. It is also possible that increasing numbers of visitors access the AHDS collections through the service providers themselves.

The RePAH project found that during the study period, 7,463 separate resources were accessed via the Humbul site out of a total of 11,680 which were publicly available when the merger took place. This suggests that 36% of the Humbul resources were

neglected during our study, although we cannot prove that they have never been accessed. It is also probable that resources are being accessed directly, for example through search engines such as Google, by typing in the URL, or using bookmarks, and not through subject portals. It is also important to remember that some specialist humanities print publications are never used, a fact recognised by the short print runs usually allowed for humanities monographs. Even in science, an average of 27% of articles are never cited, a figure that rises as high as 44.52% in Computer Science. (ScienceWatch, 1999)

However, in the case of journal or monograph publication, a commercial publisher takes the financial risk, and will sell a journal or book to a library, irrespective of whether it is read or cited. In the case of digital humanities, large amounts of public funding is wasted if a resource is not used. Thus our findings reported below are aimed at increasing knowledge of user reactions to such resources, and sharing the kind of good practice which should help to ensure that digital resources created in future have the best chance possible of being used.

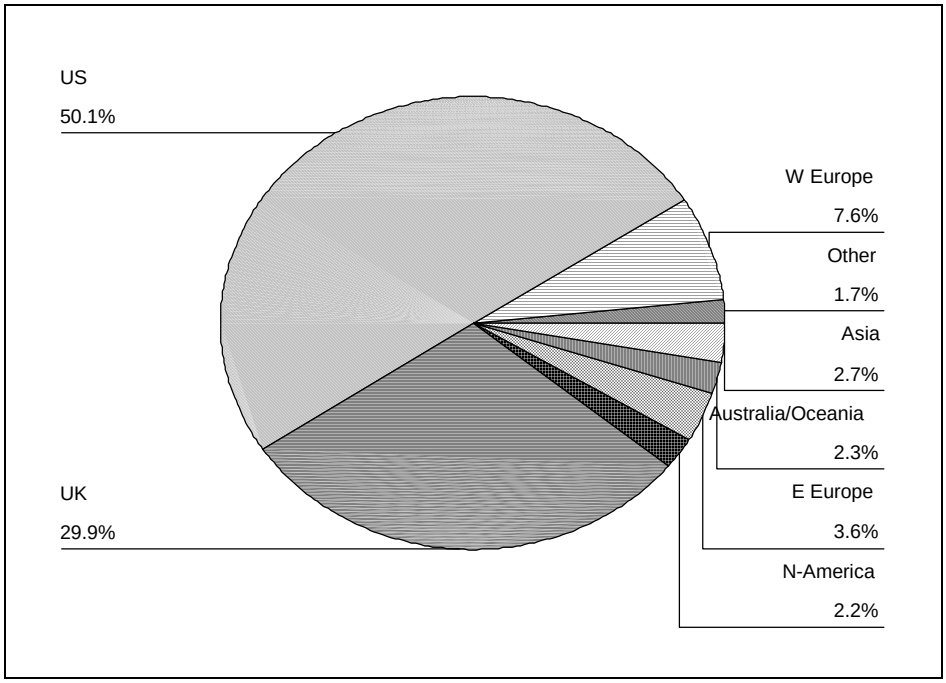
### *5.1 Log data analysis*

#### 5.1.1 Humbul logs

The logs from Humbul showed that there were about 2,000 to 4,000 daily views of the website at weekends and between 6,000 to 8,000 item views on weekdays. The majority of users came either from the UK or the US - however this figure is exaggerated by users coming in from a commercial internet service provider based in the US. For example btopenworld.com is a UK net provider that has registered as a US commercial company. Figure 1 shows the breakdown by country of use of the Humbul hub.

Take in Figure 1

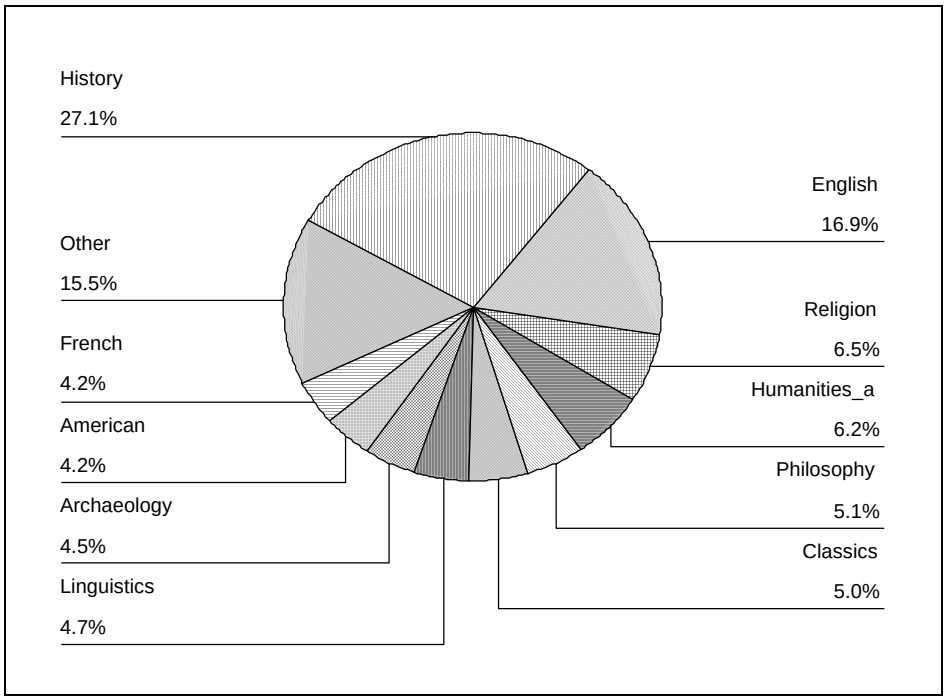
Figure 1. The share of Humbul usage broken down by user (DNS) country codes grouped into world regions. (Other = less than 1% usage)




History is the most popular subject and about a quarter (27.1%) of subject use relates to this. Other popular subjects are English (16.9%), Religion (6.5%), General humanities (Humanities_a ) 6.2%) and Philosophy (5.1%), as can be seen in Figure 2.

Take in Figure 2

Figure 2: Distribution of subject item (Menu 1) viewed (other=less than 3% usage)



The logs showed us which top level domains were most often visited. If the user decided to visit a resource, the logs recorded the site visited, and give the site address and directory of the linking resource. About 11.5% of items viewed were users actively clicking to the resource. Throughout the year 7,463 separate resources were accessed via the Humbul site. We chose the 40 most frequently sites visited for further study as shown in Table I.

Take in Table I

Table I: Top 40 resource sites accessed via Humbul

| URI Site | Number | Percentage |
|---|---|---|
| www.bbc.co.uk | 4166 | 1.5 |
| www.wsu.edu | 2473 | .9 |
| www.geocities.com | 1969 | .7 |
| www.nd.edu | 1517 | .6 |
| ads.ahds.ac.uk | 1216 | .4 |
| www.bl.uk | 1047 | .4 |
| www.arts.ed.ac.uk | 1042 | .4 |
| www.pbs.org | 1031 | .4 |
| www.emule.com (text collection) | 936 | .3 |
| memory.loc.gov (Library of Congress-American Memory Project) | 836 | .3 |
| www.fordham.edu | 813 | .3 |
| www.shef.ac.uk | 811 | .3 |
| www.channel4.com | 789 | .3 |
| www.newadvent.org (Catholic reference site) | 713 | .3 |
| www.llgc.org.uk (national Library of Wales) | 680 | .3 |
| www.spartacus.school (Historical reference) | 659 | .2 |
| www.luminarium.org (medieval studies reference) | 659 | .2 |
| etext.lib.virginia.edu (Virginia E-text Center) | 649 | .2 |
| uk.cambridge.org (Cambridge University Press) | 643 | .2 |
| www.ucl.ac.uk | 636 | .2 |
| www.iwm.org.uk (Imperial War Museum) | 624 | .2 |
| www.loc.gov (Library of Congress) | 614 | .2 |
| ccat.sas.upenn.edu | 606 | .2 |
| www.gre.ac.uk | 599 | .2 |
| www.archives.gov.on.ca. (Ontario archives) | 575 | .2 |
| www3.oup.co.uk (Oxford University Press) | 573 | .2 |
| www.archives.gov (US National Archives) | 563 | .2 |
| www.accd.edu | 560 | .2 |
| www.nationalarchives.gov.uk (UK National Archive) | 559 | .2 |
| www.georgetown.edu | | |

| | | |
|---|---|---|
| www.hti.umich.edu | 546 | .2 |
| (Humanities Text Initiative) | 540 | .2 |
| www.sas.ac.uk | | |
| (School of Advanced Study, London University) | 536 | .2 |
| www.kb.nl | | |
| (Netherlands National Library) | 520 | .2 |
| etext.virginia.edu | | |
| (Virginia E-text Center) | 506 | .2 |
| www.bu.edu | | |
| www.stoa.org (Classical texts) | 504 | .2 |
| history.hanover.edu | 503 | .2 |
| raven.cc.ku.edu | | |
| learningcurve.pro.gov.uk | 499 | .2 |
| (History school teaching materials) | 490 | .2 |
| www.17thc.us | | |
| (Collected materials colonial New England) | 485 | .2 |
| | 479 | .2 |
| | | 12.6% |

Twenty six of the sites above might be termed information or reference resources, as they are for libraries, archives, e-text collections, link sites or publishers, whether in the UK or internationally. For further study we extracted details of the sub-directories belonging to the UK universities in this list: in order of popularity, Edinburgh, Sheffield, UCL, Greenwich and the School of Advanced Study (University of London). Once again information resources were high on the list of resources linked to. Almost all of the School of Advanced study pages were for the web pages of subject research centres, like the Warburg Institute, the Institute of English Studies and the Institute of Classical Studies. There were links to digital collections, such as those at the Warburg Institute and the Institute of English Studies, but many links were made simply to the pages of research centres themselves, or their library or postgraduate forum.

Most popular resources at the School of Advanced study (with 2% or more of the total hits) are shown in Table II.

Take in Table II

Table II. Most popular resources in the School of Advanced Study domain

| URL | Frequency | Percent |
|---|---|---|
| http://www.sas.ac.uk/irs/ (Institute of Germanic and Romance | 341 | 16.23037 |

| | | |
|---|---|---|
| Studies) | | |
| http://www.sas.ac.uk/ies/centre.htm (Institute of English Studies) | 243 | 11.56592 |
| http://www.sas.ac.uk/commonwealthstudies/research/bdeep.html British Documents at the End of the Empire Project | 189 | 8.995716 |
| http://www.sas.ac.uk/warburg/ (Warburg Institute) | 138 | 6.568301 |
| http://www.sas.ac.uk/warburg/mnemosyne/DigitalCollections.htm (Digital Library collections) | 129 | 6.139933 |
| http://www.sas.ac.uk/IRS/CWWF/Index.htm | 128 | 6.092337 |
| http://www.sas.ac.uk/commonwealthstudies Instutute of Commonwealth Studies | 119 | 5.66397 |
| http://www.sas.ac.uk/ies/williamsharp.htm (Institute of English Studies, William Sharp digital archive) | 92 | 4.378867 |
| http://www.sas.ac.uk/icls/imaginesit/Default.htm (Institute of Classical studies- Imagines Italicae collection ) | 91 | 4.331271 |
| http://www.sas.ac.uk/icls/Hellenic/ (Hellenic society) | 89 | 4.236078 |
| http://www.sas.ac.uk/aristotelian_society/ | 74 | 3.522132 |
| http://www.sas.ac.uk/icls/pgforum/ (post graduate forum) | 66 | 3.141361 |
| http://www.sas.ac.uk/ies/ htm (Institute of English Studies) | 64 | 3.046168 |
| http://www.sas.ac.uk/icls/library/libhome.htm (Classical studies library) | 64 | 3.046168 |
| http://www.sas.ac.uk/warburg/mnemosyne/entrance.htm (Warburg Institute library) | 59 | 2.808187 |
| http://www.sas.ac.uk/igs/ (Institute of Germanic and Romance Studies) | 58 | 2.76059 |
| http://www.sas.ac.uk/ilas/ (Institute for the Study of the Americas) | | 2.712994 |
| http://www.sas.ac.uk/ies/cmps/Projects/Sharp/ (Institute of English Studies, William Sharp digital archive) | 44 | 2.094241 |

The large numbers of hits for the web pages of research centres, as well as specific digital resources, suggests that many users consult the web page before a visit. But that this is not done as a substitute for a visit to the centre itself. This is analogous to the way in which many museum users consult the web page before a visit for information on what is available, but very few see this as an alternative to the actual collections. (Marty, 2007)

Three of the most popular resources at Edinburgh (29% altogether) were the Centre for the History of the Book (second) the Dictionary of the Older Scots Tongue – (fifth) and the Edinburgh Journal of Gadda Studies as seen in Table III. (The last two sites do not give access to the resource, merely information about it).

Take in Table III

Table III. Most popular resources at arts.edinburgh domain (over 2% of hits)

| URL | Frequency | Percent |
|---|---|---|
| http://www.arts.ed.ac.uk/scothist/courses/eurowitchhunt/ (The | 931 | 40.69056 |

| | | |
|---|---|---|
| European Witch Hunt) | | |
| http://www.arts.ed.ac.uk/chb/index.html (Centre for the History of the Book) | 312 | 13.63636 |
| http://www.arts.ed.ac.uk/witches/index.html (The Survey of Scottish Witchcraft) | 268 | 11.71329 |
| http://www.arts.ed.ac.uk/fineart/rome.html (Rome project) | 212 | 9.265734 |
| http://www.arts.ed.ac.uk/dost/ (Dictionary of the Older Scots tongue) | 192 | 8.391608 |
| http://www.arts.ed.ac.uk/europgstudies/rprojects/avant-garde/ (Avant Garde Project) | 181 | 7.910839 |
| http://www.arts.ed.ac.uk/gadda/ (Journal of Gadda Studies) | 166 | 7.255245 |

At Sheffield University, six such resources were present in the log data, Assemblage (an archaeology journal), which was the second most popular resource, if we add hits on the top page to those on a particularly popular special issue. This is followed by The Association for Low Country Studies, CAPRA- an archaeology journal, The Centre for the English Cultural Tradition, The International Bande Dessinée Society and the Hegel Society of Great Britain as seen in Table IV. (Although each of these projects received fewer than 2% of the hits, and therefore occurred in a relatively low ranking).

Take in Table IV

Table IV. Most popular resources in the Sheffield University domain

| | | |
|---|---|---|
| http://www.shef.ac.uk/f/frenchfilmstars/home.html (French Film Starts Project) | 260 | 6.537591 |
| http://www.shef.ac.uk/french/research/gide.html (Andre Gide Editions Project) | 231 | 5.808398 |
| http://www.shef.ac.uk/uni/academic/A-C/bakh/ (Bakhtin Project) | 211 | 5.305507 |
| http://www.shef.ac.uk/uni/academic/N-Q/phil/AHRB-Project/index.html | 193 | 4.852904 |
| http://www.shef.ac.uk/assem/ (Assemblage) | 165 | 4.148856 |
| http://www.shef.ac.uk/uni/academic/A-C/bakh/sociolinguistics.html (Bakhtin project, socilinguistics) | 159 | 3.997988 |
| http://www.shef.ac.uk/uni/academic/A-C/biblst/DJACcurrres/Postmodern2/Dictionary.html (Dictionary of Classical Hebrew) | 155 | 3.89741 |
| http://www.shef.ac.uk/english/language/quantling/index.html (Quantitative Linguistics) | 151 | 3.796832 |
| http://www.shef.ac.uk/uni/projects/ptpdlp/ (Pathways to Philosophy online course) | 112 | 2.816193 |
| http://www.shef.ac.uk/japan2001/ (Waka for Japan 2001) | 105 | 2.640181 |
| http://www.shef.ac.uk/uni/academic/A-C/archst/research/process/cp01.html (Architecture, research process module) | 101 | 2.539603 |
| http://www.shef.ac.uk/alcs/ (Association of Low Country Studies) | 97 | 2.439024 |
| http://www.shef.ac.uk/assem/4/ (Assemblage issue four) | 92 | 2.313301 |

| | | |
|---|---|---|
| http://www.shef.ac.uk/p/partonopeus/contents.htm (Partonopeus of Blois Project) | 92 | 2.313301 |
| http://www.shef.ac.uk/hri/ (Humanities Research Institute) | 88 | 2.212723 |
| http://www.shef.ac.uk/archaeology/research/madagascar/ (Tombs, Landscape and Society in Southern Madagascar) | 82 | 2.061856 |

However, these resources made up a lower percentage of the total hits, (12%) which is not surprising, given Sheffield's very strong record in the production of digital resources in the humanities.

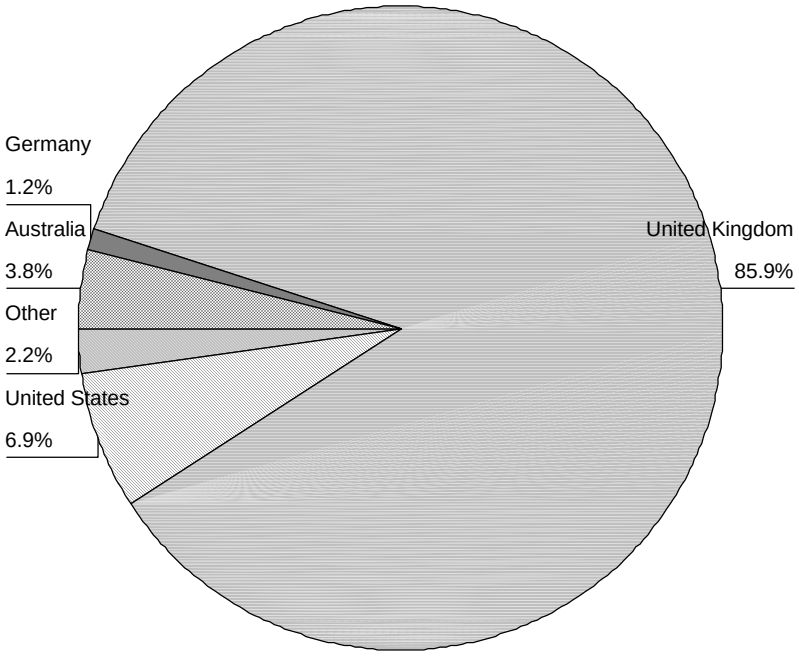
The logs from Humbul therefore show that despite its function as a portal that is primarily for specialist research resources, many of the users who clicked through to resources did so to access information resources, centres and journals.

*5.1.2 AHDS logs*

During the period of our study there were between 1000-3000 visits to the AHDS central site per day on average, from March to August 2005 this rose to between 5000- 8000 visits. The national profile is similar to that of Humbul, although when the commercial domains are removed (to allow for the apparently mis-registration of UK commercial servers) 86% of academic users are from the UK, as shown in Figure 3.

Take in Figure 3

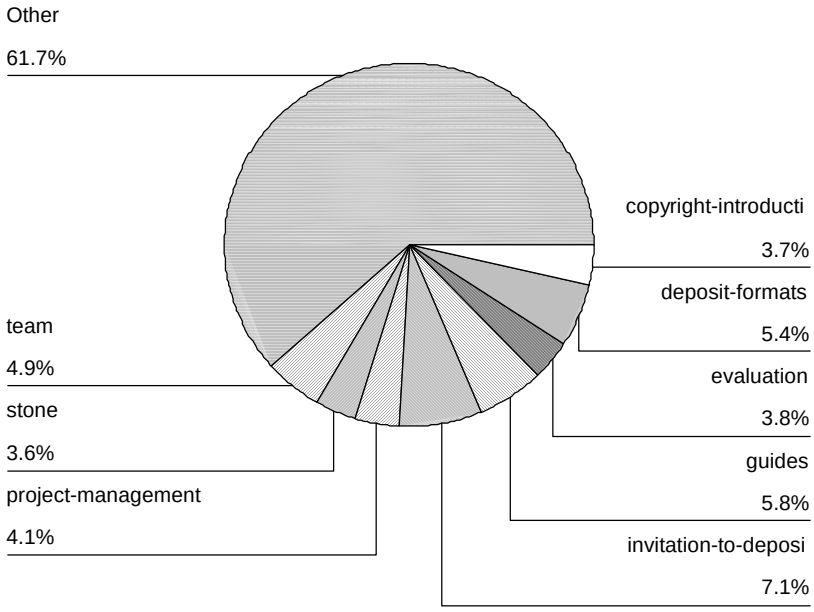
Figure 3: DNS country distribution of user sessions for AHDS – academic institutes only (other = less than 1%)




The AHDS is an organisation which archives the digital output of research projects. Thus we would expect that most users would access it to search for such archived material for re-use in their research, rather than to link through to information resources. However, a noticeable pattern, which was supported our questionnaire findings, was that many of the pages being linked to from the AHDS centres most frequently concerned the deposit of materials or copyright information, as this example in Figure 4 from archaeology shows:

Take in Figure 4

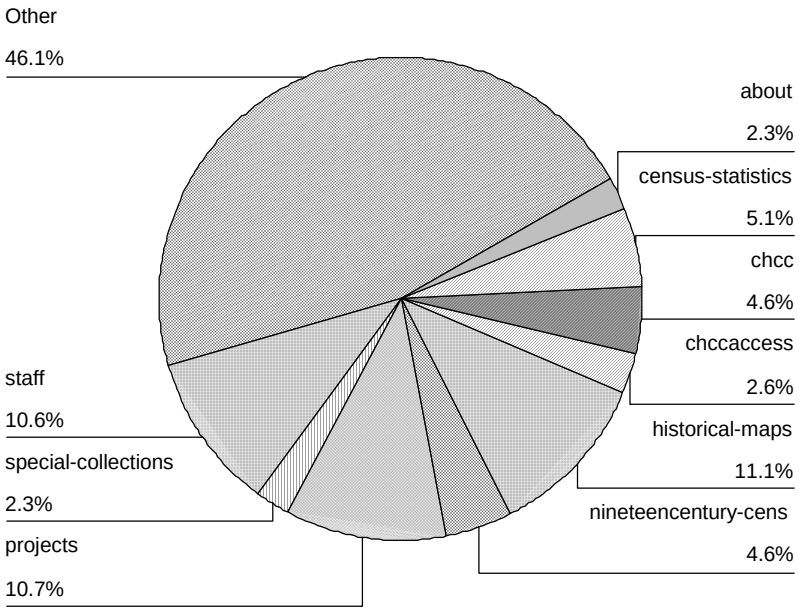
Figure 4. AHDS Archaeology pages viewed




Thus it seems that deposit is more common than re-use. However we were surprised to see the extent to which, even in the AHDS logs, information resources were being linked to. In the History section, for example we can also see frequent links being made to resources, which are again, highly generic data collections, such as census data or historical maps as shown in Figure 5.

Take in Figure 5

Figure 5. History pages viewed via AHDS




This suggests that even when users are aware that the AHDS archives a large number of specialist research resources, produced as the result of funded scholarly research projects, the majority of the users are producers themselves, or are once again looking for large reference collections. We do find references to individual research projects via the AHDS, but these occur with much lower frequency. This would appear to indicate that scholars are willing to archive their own research, but less keen to re-use data or resources created by other scholars. This was an impression supported by the subsequent work that we carried out when we attempted to re-introduce neglected resources to humanities scholars. Given that they have evidently become used to the high standards of content and data delivery set by commercial organisations and by libraries, archives, and museums, participants often found the quality of scholarly resources disappointing. Yet they felt reassured that they could trust a resource produced by an information organisation, the Imperial War Museum, given the organisation's reputation for high quality material, established in the analogue world. (Warwick et al., 2008 forthcoming)

### *5.2 Findings from the questionnaire*

#### *5.2.1 Demographic data*

We received 149 completed responses to the questionnaire in a four- month period. Eighty five percent of the respondents were from the UK, with the most common foreign visitors being from the USA, Canada and Australia respectively. Table V shows the types of roles respondents performed.

Take in Table V

| Role | Percentage of total responses |
|---|---|
| Other | 20 |
| Independent researcher | 19 |
| Lecturer/academic | 19 |
| Academic-related support person in HE | 14 |
| Research postgraduate student | 13 |
| Post-doctoral researcher | 8 |
| Taught postgraduate student | 7 |

Table V Roles of the respondents

The largest category is other, which included non-UK based respondents, retired academics, computer support personnel, and interested amateur researchers. Nevertheless, the majority of the respondents to the questionnaires were involved in academic work, whether as scholars, support personnel or students. This is perhaps to be expected, since the portal sites are designed to serve the UK higher education population. We found that all disciplines covered by the AHRC domain areas (discussed above) were represented in roughly even numbers, and that a third of the respondents said that they undertook multidisciplinary research. This demographic data means that our sample may be compared to the surveys carried out in the literature discussed above, despite the fact that our sample was of convenience rather than intended faithfully to represent the UK academic population.

The importance of information resources was immediately apparent from the questionnaire data. As the British Academy report found, (British Academy, 2005) contrary to some stereotypes, humanities scholars are not ‘luddites’, who prefer simply to use physical libraries and archives in search of print materials. Indeed, our 149 respondents were enthusiastic about the usefulness of digital resources: 87% used the web every day, and 48% for more than four hours per day, 81% identified

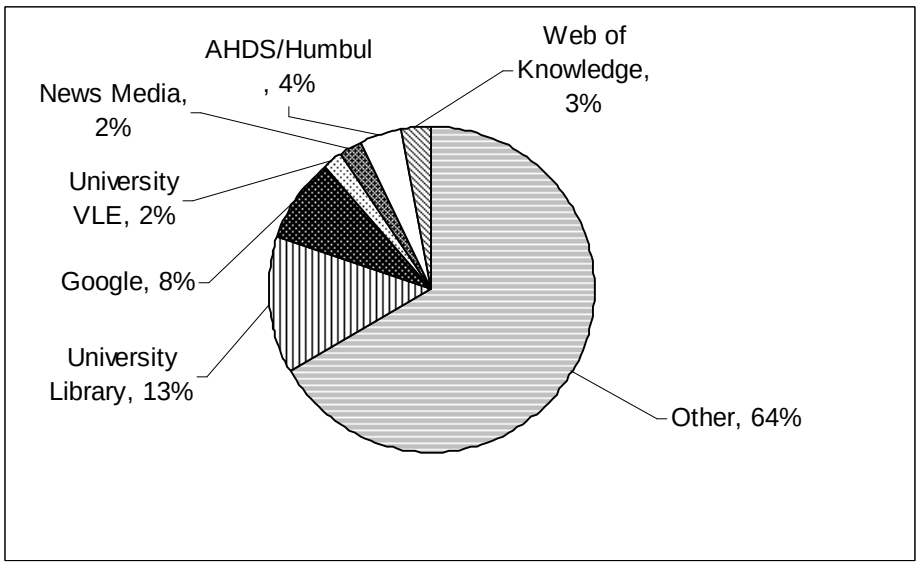
themselves as extensive users of digital resources, 88% either agreed or strongly agreed that they could not do their work without digital resources, while 74% of them agreed or strongly agreed with the statement that digital resources had changed the way that they did their research. These findings are comparable with those of the IHR and Bristol University, discussed above.

### *5.2.2 Most useful digital resources*

In order not to influence users too much we decided not to offer a definition of digital resources. But, to understand what the users' working definition was, we asked them to list their three favourite resources, in other words those that they found most useful in their research. Overwhelmingly these were highly generic resources, which might be compared in the print world to reference texts or even to a physical library, archive or special collections. As Figure 6 shows, a very wide range of resources and web sites were mentioned, but by far the most popular was the university library web site, with 13% of the users identifying this are the most important resource. Google, in comparison gained 4% of the votes.

Take in Figure 6.

Figure 6. The most useful digital resources



### *5.2.3 'Other' resources - information and reference collections*

As the Figure 6 shows, the largest category of resource was 'other'. Table I shows details of all the resources mentioned. However, the vast majority of them are what might be termed information or reference resources or gateways, such as libraries, archives and subject portals, whether these are publicly funded or commercial. For example, the British Library, the National Library of Scotland, the National Archives, JSTOR, the AHDS or Humbul, SOSIG, Literature Online (LION), and the Dictionary of National Biography (DNB). Specialist subject centres like Palatine ( for dance, drama and music - http://www.palatine.ac.uk/) were also mentioned, and privately constructed information gateway sites such as Voice of the Shuttle (http://vos.ucsb.edu/) and the Online Reference Book for Mediaeval Studies (http://the-orb.net/) as well as subject based digital libraries like Perseus (http://www.perseus.tufts.edu) and the Royal Historical Society Bibliography (http://www.history.ac.uk/partners/rhsbib.html).

The questionnaire recipients identified only four UK funded primary research projects:

- The Old Bailey Online - http://www.oldbaileyonline.org/ (Shoemaker, 2005)
- Practice as Research in Performance - PARIP - http://www.bristol.ac.uk/parip/
- Powys Digital History Project, produced by the Powys archives service - http://history.powys.org.uk/ (Reid, 2000)
- Photographic Exhibitions in Britain site based at the National Gallery of Canada, which also received some AHRC funding - http://peib.dmu.ac.uk/.

There were also two US-funded research projects, the Child Language Data Exchange (CHILDES) corpora website (http://childes.psy.cmu.edu/) and the Perseus Digital Library (http://www.perseus.tufts.edu/). It is noticeable that all the sites mentioned above are also reference resources, which aggregate or digitise a large amount of information for scholars from a number of disciplines to consult, rather than producing the results of an original research project. Two of them were also produced by a library and an archive. This does not mean of course that the respondents never used specialist digital resources, since we only asked about the ones most commonly

used, but they obviously do not use such resources as frequently as information aggregators, portals and libraries, whether digital or physical. These findings are also supported by research being carried out on a sister project in our department – User-Centred Interactive Search with Digital Libraries, (http://www.uclic.ucl.ac.uk/annb/ucis.html) in which we found a similar preference for generic resources amongst the humanities academics that we interviewed (Rimmer et al, 2006).

### *5.3 Subject domains*

When the data is broken down into the subject domains under which the AHRC organises its research panels, the same patterns may be detected. Most specialist resources were mentioned only once, and were thus classified as 'other'. The university library remains the most popular resource in all but two domains: Classics, ancient history and archaeology, and Visual arts and media. These two domains refer to Google as the main resource used in their work. However it could be argued that in the case of Classics, the physical library has been replaced by a digital one, since the Perseus Digital Library, a collection of classical resources, including text, images and virtual reality material, proves very popular.
Nevertheless, across the other disciplines, information resources account for about half of the resources identified. Where there is agreement about useful resources, they tend to be information collections. The example below is from History, but the pattern of use in other subject domains was very similar, with slight variations in the percentage or resources listed under 'other'.

Although the university library remains of paramount importance other libraries such as the Bodleian in Oxford and the British Library are mentioned by specific disciplines. All the other resources mentioned more than once are large reference collections, such as the DNB Online, JSTOR, Early English Books Online (EEBO), LION, Lexis Nexis, Grove Online, Répertoire Internationale de Littérature Musicale and Westlaw. The online news media sites are also important collections of digital information in several disciples. All of the above are of course commercial services,

and our qualitative research later demonstrated that users have quickly become accustomed to the high levels of content accuracy, updating and interface design that commercial products must provide. It is also important to note that these large information publications are usually accessed by scholars through their university web site, which again serves to heighten awareness of the library as a provider of high quality information that is trusted by scholars.

### *5.4 Comparison with IHR data*

We compared our data on all subject domains to the survey carried out by the IHR, which had agreed to ask the same question. Although they chose not to allow users to include generic resources like Google and OPACs, the data was very similar to ours, in its emphasis on information resources as the most valuable digital research materials. Possibly due to a preponderance of historians in the survey (although its terms of reference were all humanities disciplines, it was mounted on the IHR website) there was much greater agreement about the most useful resources. Even allowing for the questionnaire being produced by the IHR, British History Online was one of the most popular resources, and others that were repeatedly mentioned were EEBO, LION, Eighteenth Century Collection Online( EECO). Once again the other resources mentioned tended to be reference collections, most produced either by libraries and archives or commercial collections accessed through the university library. Again scholarly-produced resources were in tiny minority, but one of the few that was repeatedly mentioned was the Old Bailey Online, a project notable for its popularity amongst scholars, which we went on to study in detail in our subsequent case study research.

In this section we have shown that the results of the questionnaire indicate that most of our users regard digital resources as most useful as a means to access information resources. They prefer information gateways which in the analogue world might be compared to the library or archive, rather than specialist research resources which we might compare to a monograph of literary text for primary study. The number of resources which fall into the ‘other’ category also suggests that there is a very wide range of resources being used, and very little agreement as to which are must useful.

It is also notable, and perhaps a cause for concern, that scholars do not appear to use resources created for them by other scholars, preferring instead those created by commercial producers or information specialists in libraries and archives.

## 6. Discussion

### *6.1 Information collections*

The evidence of both our questionnaire and log data therefore suggests that users of digital resources in the humanities value information resources very highly. As the RePAH team have argued, most humanities users distrust pre-culled or pre-analysed collections, and prefer to make their own decisions about the data that they find, from extensive resource collections (Brown et al., 2007: p.22). A similar preference for recall over precision was noted in historians by Dalton and Charnigo (2004) and Duff et al (2004). This may help to explain why we noted a very high incidence of the use of extensive digital reference materials, over what might be termed specialist research projects. Whatever the reason, this preference is nevertheless undeniable.

Physical information resources have remained very important. This demonstrates the significance of traditional scholarly structures in humanities research. Digital resources have not replaced physical information resources, such as libraries and archives. Instead they, and the web resources that they produce, may now be an aid to further resource discovery. Thus the scholar visits the research centre page, to find out about when a seminar is being held or the historian seeks information about the opening times of a county record office on the web before a visit. Not only are university libraries the primary point of access for digital resources for many users, but national and specialist libraries and archives are also highly valued and widely used. This underlines recent research that suggests the humanities users still need traditional, generic resources and value personal knowledge repositories and face to face meeting (Barrett, 2005). It is important that we take into account such user preferences and behaviours when designing any future information resources, rather than attempting to replace the physical with the digital. Since as Adams and Sasse

(1999) have demonstrated, if information resources are designed to work against preferred user behaviours, they are likely to be circumvented, rather than used.

It may also be that academics tend to use large reference collections because they are familiar in the way that they work. E-journals have been a great success, because although accessing an article is electronic the way that this information is used is very familiar. Most people simply print and read it (Liu and Stork, 2000). In the same way, the use of material in the DNB Online is likely to be very similar to that in the print version, and participants in the IHR Peer Review study admitted that they tend to cite the printed version of, for example, the Old Bailey proceedings, when they have used the online version (IHR, 2007: p.30). This demonstrates that such resources, being familiar, are not demanding to use, in the way that new data analysis software may be.

### *6.2 The role of libraries*

However another explanation for the use of information resources may be the link once more to the university library, which is seen by scholars as a vital digital resource in its own right. Our research suggests that they use the library webpage as a portal to further resources, whether they are large reference collections, or links to other external resources. In a separate study we found it relatively difficult to find specialist digital resources for humanities research, beginning with either the departmental home page or the university library - by specialist we mean the digital equivalent of monographs, published as a result of funded research (Pappa, et al. 2006). This might help to explain why so many of the results being used are information collections themselves. These collections tend to be paid for and accessed through the library and it is possible that large information collections that are most commonly linked to by librarians, are likely to be the ones that librarians, even those who are subject specialists, are aware of. Thus users tend to follow the links provided for them, and if they do not include specialist digital humanities resources, will not look further for them.

Although subject librarians may be well aware of books and journals in their area, they may not be as up to date on specialist digital resources and analysis software. At

UCL SLAIS a module on Digital Resources in the Humanities (http://www.ucl.ac.uk/slais/teaching/modules/instg008/) provides such training for new graduates, however keeping up to date is harder for mid-career professionals. But it may be an area in which continuing professional development courses should be developed.

### *6.3 Information resources and funding*

The preference amongst users for information resources over specialist research resources has various consequences. The British Academy report suggested that given the preference for what they call secondary resources, such as library catalogues, priority should be given to the digitisation of such finding aids in preference to that of primary material (British Academy, 2005). Other ICT Strategy projects have found a desire for more digital resources, but as the British Academy report makes clear, even with the most optimistic of digitisation schedules most humanities resources are likely to be analogue for many years to come.

Our research does show the ongoing importance of the physical object and physical research centres, libraries and archives. However, we also found that as well as finding aids, humanities scholars also find large collections of reference information very useful. Thus in terms of funding priorities it suggests that, at present, projects which collect together large collections of information resources for reference, whether generic or subject based are welcomed and are likely to be well used. This has tended to favour commercial and library or archive resources, since these tend to digitise whole collections, without regard to which parts may be useful to researchers. It appears that as long as the quality of the material is good, this is just what scholars like. This does not preclude the funding of smaller, specialist research projects, whose materials may be more selective or the results of a research process and scholarly interpretation (such as perhaps an online critical edition). However, it is unlikely that such resources will attract such high levels of use. Funding bodies will therefore have to face difficult questions about whether use levels should be a criterion for funding research projects, or whether such research should be regarded as pure scholarship for which a further use is not envisaged. However, this in turn raises

difficult questions about how and whether to archive such work with an organisation such as the AHDS.

## 7. Conclusion

We began this article with the description of a university library which had assumed that digital resources could replace the need for physical libraries, and for information professionals as intermediaries. Happily for the future of the profession, our research suggests that this view is fundamentally mistaken. At least in the humanities, digital resources have not replaced the library as an important research resource. If anything, their function as information gateways has increased their importance. Far from being unneeded, digital resources require librarians to take on new roles. Librarians have therefore now become providers, producers, gate keepers and intermediaries for information. They now undertake, in digital terms, some of the roles for which publishers were needed in the print world, for example in the case of institutional repositories, and the library is now viewed as a gateway to further digital collections (Unsworth, 2005). It is therefore vital that libraries and archives are funded appropriately, and that ICT spending is not seen as a replacement for physical resources and staff.

The judgment of information professionals is, if anything, even more important. As the volume of digital information increases it becomes harder for users to keep up. However, our research has shown that users prefer to use large information collections than specialist research resources. Academics trust their library as a valued link to good quality information, and as a way of accessing such large information collection. The library is therefore a vital reassurance of the good quality of such resources, whether these are large commercial collections, or web pages that provide links to information resources from the public domain.

It is evident then that there is still a very important role for library and archive professionals as information intermediaries. One of our interviewees, a scholar who is an expert in digital resources made the following observation:

> *Increasingly what people want is guidance through the huge number, [of digital resources] people are just bewildered by the amount of information that's out there and what to do with it. So I find that people have gone from just sort of saying, "Wow that's great that you have done this" to, "Yes that's great that you have done this but how does that work with, you know the X collection or how do I incorporate that with these other things that are going on?" And you know, basically give me a list of […] your top ten.*
> (Participant 17 interview 2006)

In effect this is the kind of intermediation that librarians have always been responsible for. Far from making the skills of the information professional redundant, they have increased demand for their expertise, while widening the domain of the expert knowledge demanded of them.

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