

SUBJECT GATEWAYS: AN INVESTIGATION
INTO THEIR ROLE IN THE
INFORMATION ENVIRONMENT
(WITH PARTICULAR REFERENCE TO
AERADE, THE SUBJECT GATEWAY
FOR AEROSPACE AND DEFENCE)

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Abstract

This work-based dissertation is an investigation into the user views and perceptions of AERADE, the web portal for aerospace and defence which is run by information professionals from Cranfield University and the Royal Military College of Science and an exploration into the value and effectiveness of Subject Gateways in the information environment.

The scope of this project is narrow in that only one specific Subject Gateway is considered in any detail, others being considered through a smaller scale evaluation.

A user survey was undertaken in late 2001, involving both a paper and online questionnaire. Results were collated and presented in exploded pie graphical representations.

Results from the survey have suggested that the service is perceived as useful and successful in its present form, and is used in many countries worldwide. The results also indicated that there are areas where the AERADE could be expanded, clarified or improved. These areas include: publicity; translation services; contents indication; expansion of areas covered (wider range of resources); clearer indication of the many services of AERADE.

The literature and the Subject Gateway evaluation suggest that Subject Gateways are important elements in today's information landscape. In contrast with Internet directories resource descriptions in Subject Gateways are of high quality and the services are of use to researchers, academics and other professionals in the specific field, and could be of use to the wider community. However, the literature and evaluation also suggest that sustainability is one future problem that Gateways will face. User evaluations can help to identify the needs and views of a Gateway's user-base. It could be concluded, therefore, that more evaluations are needed as is further research into Subject Gateways before they can be developed until they are secure in today's information landscape.

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Introduction

1.1 Background & Organisational Context

This dissertation is an investigation into the relevance, role and value of Subject Gateways, with particular reference to AERADE, the Gateway for aerospace and defence, devised and maintained by information professionals at Cranfield University Library and the Royal Military College of Science Library

Subject Gateways came into existence largely as a result of the Follett Report's conclusions that libraries needed to change to take account of the new information environment:

The traditional view of the library as the single repository of information needed for teaching, learning, and research is no longer adequate ...The emphasis is shifting towards information and information access. (Follett, 1994)

To support this access to information it was proposed that there would be investment to support IT projects. The recommendations for these projects:

would be implemented within an IT oriented libraries initiative under the auspices of the funding councils' Joint Information Systems Committee (JISC). This would run for a finite period and would be guided by an expert advisory group and supported by a programme coordinator. (Follett, 1994)

The resulting programme of projects, eLib, was 'a huge enterprise, covering more than 5 years, involving hundreds of people, and costing in excess of £20m' (Rusbridge, 2001). One strand of eLib became ANR (Access to Networked

Resources) and one outcome of this branch was the creation of Subject Gateways. These were an attempt by information specialists to tame the chaos of the Web by discovering, evaluating and cataloguing quality Internet resources into subject based databases or 'Gateways.' It was recognised by information professionals early on, then, that users needed some help in navigating the vastness of the web. Subjects considered particularly appropriate for the development of Gateways were art (ADAM), engineering (EEVL), health (OMNI), social sciences (SOSIG) and business (Biz/ed).

AERADE was launched in November 1999 as a quality Subject Gateway of aerospace and defence information on the Internet. The justification for an aerospace and defence Subject Gateway was given in the original Expression of Interest for funding for the service:

Over 50 higher education institutions have specific academic programmes in aerospace and mechanical and manufacturing engineering. There were 4007 aeronautical students alone in the UKHE sector in 1996/7 (Cranfield University, 1998)

The Expression of Interest also drew on the findings of a study undertaken by AIM-UK (Aerospace Information Management UK):

While the study found evidence of the growing importance of the Internet as an information resource amongst aerospace scientists and engineers it also demonstrated that awareness of key individual sources ...[is]...woefully inadequate (Hanley, K., Harrington, J., and Blagen, J., 1998).

1.2 Aims and objectives:

1.2.1 Aims

- To critically evaluate the AERADE Subject Gateway
- To consider the role, value and effectiveness of Subject Gateways in the current information environment

1.2.2. Objectives

- To explore the value and effectiveness of Subject Gateways in today's information environment
- To produce a snapshot of the users' view of AERADE
- To analyse the strengths and weaknesses of AERADE and to make suggestions for possible changes/improvements/future directions

1.3 Scope

The development, relevance and role of Subject Gateways, the user perceptions of predominantly UK Subject Gateways in general and of the AERADE Subject Gateway in particular will be investigated. Research into the user perception of AERADE will involve gathering opinions of UK students, academics and industry users as well as users worldwide.

1.4 Justification

A SWOT analysis was carried out on AERADE in 2001 and one weakness was identified as a 'lack of proper user evaluation' and the fact that theories about user perceptions are 'based on educated guesses.' (Meaden, 2001). In order to evolve and to expand services it was deemed necessary to identify the needs and desires of the user community. Dempsey, Gardner and Day state that:

It was recognised that it would be useful to know much more about who was using the gateways, in what ways they found them useful, and how they related to other information resources. (Dempsey, Gardner, Day, 1999).

Heery agrees, stating:

What does the user want from the research experience? Understanding users' behaviour in relation to gateways will enable gateway managers to position themselves within the mesh of existing gateways and meet the needs of their target audiences. (Heery, 2000)

This research, then, should contribute to the pool of knowledge in the information profession on the use and perception of Subject Gateways by a user community, while also providing the AERADE team with information gathered from the survey responses that will enable them to further develop the service.

1.5 Methodology

The methodology for this investigation has a triangulation approach involving a literature review, a user survey which was implemented in both hard copy and online, and a small-scale study of five RDN Subject Gateways in comparison with two search engine directories. Randomly picked users of AERADE, and establishments where there were potential users were sent a paper questionnaire. An online questionnaire was also produced which ‘popped up’ when users accessed AERADE. These results were collated and analysed. The small-scale investigation involved using the ratings system developed by Argus Clearinghouse for the Subject Gateways included on their database to analyse the strengths and weaknesses of five RDN Subject Gateways and AERADE, and then to compare them with two Internet search engine directories. The results were collated into a table for ease of analysis.

2. Methodology

2.1 AERADE

The method of data collection for the evaluation of AERADE was discussed and finalised in a meeting with the AERADE team. The team wanted certain questions addressed; these were noted and a questionnaire, using information gained from Bourque and Fielder (1995), Foddy (1993) and Fink (1995), was devised (see appendix A). A questionnaire was used rather than other forms of data collection such as interviews as it was felt that the highest volume of data could be gathered by this method, therefore enabling more reliable conclusions to be drawn. It was also felt that a survey would cover a wider user-base than any other form of data collection.

The basic aims of the questionnaire were discussed and discovered by addressing the concerns that the team as a whole had in relation to the AERADE service. One concern of the team was to gain a 'snapshot' of AERADE as its users perceive it. They felt that the service was provided by them 'blind' with no idea as to whether what they were including was fulfilling the information needs of the particular user base. Other concerns voiced by the team included:

- How often do users access the service?
- How did users find out about AERADE?
- Do users search or browse?
- How successful are their searches?
- If unsuccessful in searching, what is their next action?
- Are the catalogue records useful?

- Is the interface confusing; do users know which service they are using?

These questions were addressed by presenting users with a list of alternatives from which to choose their answer, but also providing an 'other' choice with space for free text if their answer did not fall into one of the categories supplied. Both closed and open questions were included, thus obtaining answers to specific questions and allowing for a more general response. Some questions asked users to rate their response to certain aspects of the service and this was obtained using a 5 point Likert scale.

It was decided that both a paper and an online questionnaire would be implemented. The online questionnaire would obtain answers from current users of AERADE, but the paper questionnaire would hopefully also reach those who did not use the service, thus enabling the identification of what other services these people were using to fulfil their information needs.

The paper questionnaire was piloted in September 2001 by randomly selecting 60 military students from the Royal Military College of Science and from Cranfield University. On the basis of the evaluative comments on the questionnaire returns alterations were made to two questions. The final questionnaire was sent out in November 2001: 150 paper surveys were sent to military students and staff of RMCS and Cranfield University, and to members of the Aerospace and Defence Librarian's Group for distribution to their readers. The client base of AERADE consists of users from the education sector, industry, local government and researchers. This base was,

therefore, covered in the selection. The final date for acceptance of returns was 20th December 2001.

The online survey, almost identical to the paper survey in its questions, was put online by a member of the AERADE team who had administrative responsibility for the site. It appeared as a pop-up box which opened each time the AERADE website was accessed. This went live on 19th November, 2001, with the same closing date as the paper survey.

2.2 Analysis

The data was collected after the closing date for return of surveys and each answer was coded. The data was collated into an Excel worksheet and for each answer an exploded pie diagram was created using Excel to graphically illustrate the answers using percentage ratings. It was felt that presenting the data in this way afforded maximum ease of interpretation.

The free text replies were collated for each question and presented in statements, exactly as they were given in the survey returns.

2.3 Other Subject Gateways

Five major Subject Gateways from the eLib arm of the Resource Discovery Network were chosen for investigation. These were described and evaluated using elements from the ratings system of the Argus Clearinghouse (Argus Clearinghouse, 2002).

Each criteria of the ratings system was matched against each Subject Gateway in order to form a comparative overview of the Gateways.

2.4 Search Engine Directories

Two major search engines were chosen for investigation and comparison to Subject Gateways. Using established qualitative evaluation criteria and through an investigation into the method of their database formation these search engines were compared to and contrasted against Subject Gateways.

2.5 Literature Review

A review of current literature pertaining to Subject Gateways was undertaken using relevant electronic databases, periodical databases, Internet periodicals and library catalogues.

3. Literature Review

3.1 Development of Subject Gateways

Subject Gateways offer a means of bringing control to the Internet and involve creating some kind of catalogue record for sites included. This literature review will therefore concentrate on Subject Based Gateways, their emergence and role in the electronic library environment in the UK, aspects concerning cataloguing Internet resources, and the sustainability of Subject Gateways.

The literature on Gateways and cataloguing the Internet is vast, even though the area only really began to be widely considered during the 1990's. Dempsey outlines the historical perspective to Gateways, which 'emerged in response to the challenge of 'resource discovery' in a rapidly developing Internet environment in the early and mid 1990's.' (Dempsey, 2000). It was this rapid growth of the Internet and use of the Internet, without any one, comprehensive indexing or classification system, which led to a vast network of information that became increasingly difficult to navigate or to search.

Dempsey also states that the term 'Subject Gateway' 'was popularised in the UK Electronic Libraries Programme (eLib), and it has been given currency by initiatives which have been influenced by the eLib Gateways.' (Dempsey, 2000)

The eLib programme:

was an initiative of the Joint Information Systems Committee (JISC) of the UK Higher Education Funding Councils, following the publication of the Follett Report on Libraries. (Law and Dempsey, 2000)

Kerr and Macleod emphasise the influence that the Follett report had on libraries, as it stated that ‘the exploitation of IT is essential to create the effective library service of the future.’ (Kerr and MacLeod, 1997). The Follett report also states of the Internet that ‘Its long term potential will be for information. Information which is provided quickly and reliably will eventually have a dramatic effect on the decision making functions of society.’ (Follett, 1994). The Internet, then, has had and will continue to have a wide-ranging effect on culture, society, education and research. Ward states that ‘The growth of the Internet has engendered an information-addicted community eager for quick access to current electronic data.’ (Ward, 2001.)

3.2 Drawbacks of Internet

The problem with relying on the Internet and Search Engines such to provide data is, as Pitschmann states, that:

search results can be so overwhelming that the user cannot be expected to evaluate them in a reasonable length of time ... Results may be far removed from, or totally unrelated to, the desired findings ... the artificial intelligence technologies employed by the major Web discovery tools and insufficient to retrieve and adequately evaluate scholarly content. (Pitschmann, 2001).

Pitschmann also argues that ‘Searching the Web on any topic will retrieve all information pertinent to one’s query, but there will be no qualitative evaluation or

filtering of the content.’ (Pitschmann, 2001). He states that ‘Only when sites have been reviewed, evaluated, selected, and catalogued will users be spared the ambiguities resulting from the randomness and ‘quantity without quality’ of Web search results.’ (Pitschmann, 2001). Kerr and MacLeod agree, arguing that ‘as the indexes of ... large search engines are created by indiscriminate trawling of the Internet, there is no emphasis on quality of resources retrieved.’ (Kerr and MacLeod, 1997). The explosion of information on the Internet, then, and the need to tame the potential chaos, was one of the reasons why gateways became so popular and prevalent; as Dempsey points out, there are now ‘portals everywhere.’ (Dempsey, 2000).

3.3 Advantages of Subject Gateways

Sladen and Spence highlight the advantages of using Subject Gateways:

While offering a single point of access to Internet-based resources in a given field, selective subject gateways have one key feature which distinguishes them from more commercial enterprises – they are characterised by a quality control methodology based on skilled human input from the relevant academic discipline. (Sladen and Spence, 2000).

Many authors have stated that library and information professionals are the ideal candidates to ‘tame’ the chaos of the Web. Ward argues that ‘The library and its trusted information specialists are in a unique position to guide people to research quality information.’ (Ward, 2001). Bater argues that:

We have let the Web techies and their masters dumb down one of the biggest and most comprehensive information resources of them all, applying their

Web crawlers with minimalist indexing strategies without even a nod of recognition for close-on 130 years of information science. (Bater, 2000).

This contention between information professionals and computer professionals seems to present a constant problem in information environments, yet the literature does not seem to suggest that the solution may lie in better computer instruction in library schools, thus enabling newly qualified library professionals to contribute more knowledgably and meaningfully to the situation.

Pitschmann states that 'by selecting a subset of resources that meet predetermined criteria and by facilitating access to them, librarians impose a quality structure on those resources.' (Pitschmann, 2001). Sreenivasulu, in his article which reads almost like a job description for a digital librarian, states:

The navigation of the future would tend to integrate with the human-assisted information retrieval from the networked universe and would support rapid information navigation and precision retrieval. The digital librarian is an expert in navigation, browsing and filtering digital reference services and electronic information services. (Sreenivasulu, 2000)

Perhaps the digital librarian should also be an expert in computer science?

Ward states that 'The success and marketability of the twenty-first century library hinges upon its response to the Internet.' (Ward, 2001). The way that some librarians seem to be responding is by creating or collaborating in the creation of Subject Based Gateways.

3.4 Subject Gateways and Resource Descriptions

There are many definitions of the term ‘Subject Gateway’ in the literature, a term which Dempsey, Gardner and Day state ‘has become part of the lexicon of network information use in the research, learning and cultural arena.’ (Dempsey, Gardener and Day, 1999). Koch states that:

A Subject Gateway is an Internet service with a primary focus on distributed Internet resources ... which support systematic resource discovery ... The service is based on resource description. Browsing access to the resources via a Subject structure is an important feature. (Koch, 2000).

Wiseman states that ‘Subject Gateways provide lists of quality-tested resources in specific disciplines, and often a variety of value-added services relevant to the specific disciplines.’ (Wiseman, 1998). Dempsey, Gardner and Day suggest that Gateways have some or all of the following characteristics:

services based on resource descriptions; high level of manual creation/intervention often by information and/or Subject specialists; search and browse access; collection development policy, supported by selection and quality criteria; collection management policy, supported by maintenance and updating procedures (Dempsey, Gardner, Day, 1999)

Koch states that:

Quality controlled Subject Gateways are Internet services which apply a rich set of quality measures to support systematic resource discovery. Considerable manual effort is used to secure a selection of resources which meet quality criteria and to display a rich description of these resources with standards based metadata. (Koch, 2000)

These comments highlight the fact that it is in large part the resource description that makes Subject Gateways so useful. The *Desire information Gateways Handbook* states that:

One of the key roles of Internet Subject Gateways is the creation of descriptive metadata about networked resources which can be used as a basis for searching and browsing the Gateway. These descriptions can also help Gateway users to identify whether the resources are really what they need, potentially saving them a considerable amount of time browsing through the ... information available elsewhere on the Internet. (*Desire Information Gateways Handbook*).

Resource description, or cataloguing, has been a library practice for a very long time. Taylor states that 'The Anglo-American Cataloging Rules, Second Edition ... including all its updates and revisions, has served successfully in providing guidance in cataloging materials of all kinds for two decades.' (Taylor, 1999). But as Hsieh-Yee points out, 'The nature and variety of resources on the Internet underscore the need for information organization in the digital age ... the question is whether cataloguing is the answer.' (Hsieh-Yee, 2000). Medeiros is in no doubt that bibliographic cataloguing is not the answer: 'the point is clear: traditional MARC/AACR based catalogs and cataloging cannot handle the Web.' (Medeiros, 1999). Dempsey suggests that:

What is required is a description which is simple to create yet full enough for effective retrieval and relevance judgement. This implies a description which falls between the terseness of the crawlers and the fullness of a research library catalogue. (Dempsey, 2000)

Ayres argues that traditional cataloguing is too complicated, especially for the user:

Users are often baffled or more often frustrated in attempting to use a catalogue and it is not surprising if they sometimes wonder if the complexity is

really necessary or even worse whether it is based on some sort of witchcraft. (Ayres, 1999).

Ayres goes on to suggest that ‘much of the complex structure that is now in place is there because it was needed in a pre-automation era or to handle the production of national bibliographies.’ (Ayres, 1999).

Medeiros comments on the slow change process that he sees as dogging the library profession:

Changes rarely take a quick route in libraries ... tradition and complacency hook the profession, often preventing its practitioners from seeing better alternatives or complements to the way things have always been done. (Medeiros, 1999)

Taylor highlights the 5 major problems he sees for catalogers in attempting to use AACR2 for Internet resources: ‘What is an information package ... what is an Internet resources’ chief source of information ... what is a new edition ... are all Internet resources ‘published’ ... why a rule of 3 [for authors] ... ?’ (Taylor, 1999). Taylor makes a valid point when he states that ‘it is not as if the 3 x 5 card is still governing the amount of space available.’ (Taylor, 1999)

Commentators as little as four years ago were warning against the perils of being swept away by the Internet:

We should not allow ourselves to be seduced by the current popularity and ‘trendiness’ of electronic resources and the Internet into either totally rejecting existing, traditional means of providing access and organization of information where those means are appropriate for the type of information, or jumping on to technological bandwagons and disregarding the fact that resources on the Internet are purely other potential resources. The Internet *per se* does not

make data into knowledge, and does not make electronic information more or less desirable than any other media in which it is held. (Strutt, 1997)

Strutt does not allow for the idea that users may, indeed have come to regard the Internet as their preferred research tool. Information at the touch of a button is what students of today have come to expect.

Two years later Medeiros counteracts Strutt's comments with the now prevailing view of the information seeking environment:

While the library community forges new ground in an attempt to catalog portions of the Web, we are at the same time diminishing the prominence of print resources and the online catalog. More and more, users want, expect and pursue fulltext. (Medeiros, 1999)

Vinh-The Lam, in an article which 'traces the decade long history of the library world's efforts to catalog the ... Internet' points out that:

Some librarians considered Internet materials as too much unstable to be effectively cataloged ... others wondered if increasingly powerful search and browsing tools, automated indexing tools and 'intelligent agents' would obviate the need for catalogs.' (Vinh-The Lam, 2000)

There have been changes in traditional cataloguing that have tried to take account of the changing cataloguing environment. As stated in the *Desire Information Gateways Handbook*, 'Recent developments include ISBD(ER) ...[and]...in 1997 the IFLA Universal Bibliographic Control and International MARC Programme (UBCM) published a revision of ISBD(CF) for 'computer files'.' (*Desire Information Gateways Handbook*). However, Ayres argues that the changes made are not wide-ranging or deep enough:

The recent International Conference on the Principles and Future Development of AACR held in Toronto [1997] seemed more concerned with improvements needed within the present framework and did not look in any great depth at new concepts in cataloguing which are needed to take full advantage of the new technical developments which are appearing. (Ayres, 1999).

Other strategies have been devised in an attempt to deal with this problem, such as the Dublin Core Metadata Initiative which ‘provides card catalog-like definitions for defining the properties of objects for Web-based resource discovery systems.’ (DCMI web site) and which serves as a ‘simple alternative for library catalog records for Web resources.’ (Weibel & Koch, 2000). There is also Nancy Olson’s ‘Cataloging Internet Resources: a manual and practical guide’ which was published in response to OCLC’s Internet Cataloguing Project begun in 1991. (Parris Sibley, 1998). The ROADS (Resource Organisation and Discovery in Subject based services), which was funded by JISC via the eLib programme was:

A collaborative project which contributed to the broad aims of the electronic libraries programme by providing a software tool-kit and a standards framework for the information gateways being developed under the Access to Network Resources (ANR) initiative. (ROADS website)

This project produced software which provided support for gateways and which many of the original eLib gateways used. (Dempsey, 2000).

Medeiros argues for a collaborative approach to Internet cataloguing; a blending of old and new techniques:

A complementary blend of traditional practices (OPACS/MARC/AACR) with emerging standards (CORC/Metadata is in my mind a reasonable path to

pursue. The catalog's heyday may be behind us, but its usefulness is not. (Medeiros, 1999).

Pitschmann also recognises this need for cooperation between methods as he points out that the Internet Scout Project posted a vacancy for a cataloguer in January 2001 with the following skills and experience: 'AACR2, USMARC format, and emerging standards such as Dublic Core.' (Pitschmann, 2001). The Desire Handbook points out that:

Gateways tend to opt for more flexible and less formal cataloguing solutions, using less complex metadata formats like Dublin Core. This is largely because these formats can be flexible and quick to respond to new developments in the ever-changing Internet environment. (Desire Information Gateways Handbook website)

A comparative evaluation of Subject Gateways by Haynes et al. in 1998 stated that 'it was argued that the prime role for subject based gateways is to make critical assessments of resources.' (Haynes, et al., 1998). This implies, then, that it is not solely the catalogue record which is important, but the fact that resources are critically assessed, reviewed and 'bad' sites filtered out; but an interesting flip-side to this argument is voiced by Sladen and Spence:

If subject gateways only select good quality resources, to what extent to they take away the user's ability to decide for themselves whether to consult a resource? This has been one of the major challenges to the whole concept of subject gateways. (Sladen & Spence, 2000)

This is a valid point, however it could be argued that the constant exposure of readers to quality websites, with catalogue records which indicate author details and other information to suggest that the information comes from a reliable source, would alert the user when and if they come across unreliable sites which do not display this

information.. It is a matter of concern that this information is sometimes difficult to find, even on the most reputable sites. Exposure to quality evaluated sites which are well made and well maintained should surely, it could be argued, make the user sensitive to badly made and badly maintained sites.

Another question to be addressed is if Internet resources can be included in a library's catalogue, why then create separate Subject Gateways for them? Medeiros argues that 'Believing that all quality resources deserve a place in the online catalog is honorable, though no longer practical. We must think beyond the scope of the OPAC and apply a more holistic approach to information provision.' (Medeiros, 1999). Pitschmann argues that including them in a quality controlled Subject Gateway gives the user peace of mind: 'users can ... be assured that access to these sites will be stable, and that resource discovery will be tailored to the characteristics of the collection and its content, rather than to features of a specific search engine.' (Pitschmann, 2001).

3.5 A Future for Subject Gateways?

Pitschmann goes on to highlight one of the problems for the future of Subject Gateways:

Why collect free Web resources? The obvious answer is that current users need facilitated, value-added access to these resources to ensure that they will retrieve sites with high-quality content. The primary question for the future is whether broad application of enhanced metadata standards and next-generation search engines will allow end users to mine the Web themselves with greater precision than is currently possible and, in so doing, bypass the current need for facilitated access. (Pitschmann, 2001)

Mining the web using search engines will not, however, provide evaluated sites, as literature previously discussed has suggested; perhaps at best there will be relevance ranking, but users will still have to perform the evaluation procedure for each site themselves.

However, he later argues that, 'Until technology can facilitate the harvesting and cataloguing processes, manual practices will continue to be used.' (Pitschmann, 2000). Subject Gateways would appear to have a future, however short term, but another future problem for many of them is highlighted by Dempsey, Gardner and Day: 'A major issue facing the Gateways is that of sustainability: how to secure enduring support to allow longer term planning and continued operation.' (Dempsey, Gardner and Day, 1999). These authors found that many Gateways have tended to rely on 'soft money': 'project or research funding that is temporary, unpredictable or fragile ... This reliance created issues for long term planning, collaboration and service development.' (Dempsey, Gardener and Day, 1999).

This initial reliance on 'soft money', however, was part of the original plan of the eLib project, as Rusbridge points out:

One of the big issues from the start of the programme was that each project had to have a finite funded life of up to 3 years. Services that might ensue beyond that point had to be self-sustaining, i.e. had to have an 'exit strategy' that did not depend on continued injection of JISC funding. (Rusbridge, 2001).

Pitschmann argues that the creation and maintenance of Subject Gateways appears thus far to have been undertaken in a small, unsupported fashion: 'Their construction has become a cottage industry, often fuelled by the voluntary and devoted effort of

individuals who have taken it upon themselves to identify and catalog worthy resources.’ (Pitschmann, 2001), but he goes on to state that his findings suggest that:

developing and managing collections of free Web resources have wide-ranging, long-term implications for human resources, organizational issues, and fiscal matters that extend well beyond the circle of individuals responsible for selecting those resources. (Pitschmann, 2001).

He argues that the creation and maintenance of Subject Gateways calls into question the work priorities of library staff:

Staff members responsible for selecting and cataloguing analog materials have full-time jobs. Increasing their responsibilities to include developing collections of free Web resources calls into question pre-existing priorities ... which is a higher priority: processing new books that are not free, or cataloguing free Web sites? (Pitschmann, 2001)

This argument does not consider the rapidly changing library environment, where electronic resources are replacing ‘analogue’ materials, but the point is valid: Subject Gateways do take up staff time and effort. As Heery states: ‘Creating resource descriptions is one of the most time-consuming and costly tasks for gateways.’ (Heery, 2000).

The ‘business’ side of Gateways is something that the literature suggests has been ignored by Gateway organisers:

It is probably fair to point out that those developing information gateways have tended to spend time considering technical and intellectual issues like interoperability and gateway selection criteria rather than to review the business and legal context in which gateways exist ... The focus now needs to change ... it is becoming clear that the development of sustainable gateway services will be dependent upon a clear understanding of the business and legal context in which information gateway services operate. (Day, 2000)

Dempsey has developed business models under which Gateways can or could operate. These include: 'Collective activity through membership' where Gateways indulge in collective activity through membership of some kind of organisation, but would still need 'to develop services that might attract paying members.' 'Shared public investment' where 'Gateways are funded as a service by some public body.' 'Publicly funded research and development' which has been used by many Gateways, especially at the start; the problem, as stated before, being that 'funding tends to be limited in both scope and time-scale.' 'Public investment as part of the role of cultural, educational or scholarly institutions', where Gateway funding is seen 'as part of the role of developing cultural environment', as a type of public investment. Finally there is the 'commercial model' which could include 'investment in resource description activity as 'added value' to ... a range of subscription-type services.' Or 'providing data supported by advertising or other services based on the value of the attention of visiting users.' (Day, 2000). It is pointed out in this Renardus report that 'Gateway services (or those who host them) own the IPR in the resource descriptions (metadata) that they have created and maintain. These are resources of significant value in their own right.' (Day, 2000). The Intellectual Property Right in the resource description could again, then, be seen as a potential means of creating revenue. The same report states that 'Choosing an appropriate business model is important for gateways because it has a strong influence on how sustainable any given service is.' (Day, 2000).

The literature discussed in this review illustrates that the information profession has come a long way in taming the web through the devising and implementing of

quality-controlled Subject Gateways. It also indicates that there are still hurdles to be overcome if they are to become permanent, sustainable elements of the information landscape. To find out exactly what users think of them and how they use them is one step that could help in their future development.

4. Subject Gateway Evaluation

4.1 Introduction

This evaluation of Subject Gateways will consist of the assessment of five Gateways that are part of the Resource Discovery Network. The criteria used for assessment will also be applied to AERADE and to two Internet directories. The five Gateways considered here (apart from AERADE) are the eLib Subject Gateways which formed the Access to Network Resources strand of eLib. Their initial aim, as Dempsey states, was to

save the time of their users, to connect them to resources which supported their learning, teaching and research interests, and to make sure that information about useful resources was effectively disclosed (Dempsey, 2000)

4.2 Resource Discovery Network

After the establishment of Subject Gateways through eLib, the Resource Discovery Network was developed in order to ensure their continuation and to ‘bring them together in a new federated structure.’ (Dempsey, 2000). It was (and is) run by King’s College London in combination with UKOLN at the university of Bath. It consists of a network which comprises of a centre and a set of hubs, which are independent service providers. The hubs are:

- BIOME – Health and Life Science
- EEVL – Engineering, Maths and Computing
- Humbul – Humanities

- PSIGate – Physical Science
- SOSIG – Social Sciences, Business and Law

Hubs:

Provide data for the RDN. They are also services in their own right, providing gateways to Internet resources in their subject areas and often other electronic services too. Hubs may be individual organisations or (more frequently) consortia of prominent library, academic, research and professional organisations. (RDN website, 2002)

The RDN is now ‘a collaboration of over sixty educational and research organisations, including the Natural History Museum and the British Library.’ (RDN website, 2002).

4.3 Argus Clearinghouse

Argus Clearinghouse is a central access point for Subject Gateways. It was developed from a University of Michigan project. It uses a ratings system for the selection of Subject Gateways into their database. Elements from their system will be used for this evaluation and have been chosen as the most appropriate to the evaluation of the Subject Gateways considered here. The full ratings criteria can be found on their website (Argus Clearinghouse, 2002). Assessment criteria for this evaluation will be adapted from the ratings system developed and used by the Argus Clearinghouse and will be implemented by looking at the Gateway as a whole and by considering ten randomly picked resource descriptions. A comparison table will be produced using the ratings system of the Argus Clearinghouse which is a rating of 1-5 (1=poor, 5=excellent) to compare the RDN Subject Gateways and AERADE. Points will be deducted if a particular element is not present or if an element is of poor quality. The criteria chosen from that ratings system for consideration in this evaluation are:

Level of resource description:

- Description of the resources' content
- Intended audience for the resources

Level of resource evaluation

- Quality of content of resources
- Assessment of resources usability
- Authority of resource authors

Guide Design

- Layout
- Navigational aids

Guide meta-information

- Mission of guide, why it was created, what it contains and what it leaves out
- Information about authors
- Information on how to contact the authors
- Update frequency
- Other services

Although not part of the Argus ratings system the aspect of whether other services are offered will also be considered

4.4 Resource Discovery Network Subject Gateways

4.4.1 SOSIG (for homepage see Fig. 2 Appendix B)

Run by the Institute for Learning and Research Technology at the University of Bristol SOSIG ‘aims to provide a trusted source of selected, high quality Internet information for students, academics, researchers and practitioners in the social sciences, business and law’ and contains ‘thousands’ of resource descriptions. (SOSIG website, 2002).

SOSIG: Level of resource description:

Paragraph descriptions are given for each resource. Some entries contain an indication of intended audience. Descriptions also contain keywords, hyperlinked subjects and a language indication.

Rating: 5

SOSIG: Level of resource evaluation:

The quality of the content of the resource description is excellent. Elements such as search facilities and full-text availability are included where appropriate. There is detailed information concerning the scope of the resource and its content. Authority is indicated in the resource description; an email contact for the resource is also provided.

Rating: 5

SOSIG: Guide design:

The layout is clear and uncluttered with a white background and no animated graphics. Headings are clearly marked in bold. A consistent blue is used for certain text elements throughout. Navigation is through search or browse. The search facility has an advanced search and a thesauri search option. The subject listing is below the search box, making navigation throughout the site easy and accessible from the home page.

Rating: 5

SOSIG: Guide meta-information:

Mission information is available in 'about us' where the aims of the Gateway are clearly stated. Coverage is stated as being social sciences, business and law. Names and contact details are available for site authors and section editors. No indication of update frequency seemed to be available.

Rating: 4

SOSIG: Other services:

Other services offered from the home page include Grapevine, a career service; Likeminds, a linking agency; 'My Account,' which is an opportunity to create a personalised service and to register for an email update.

Rating: 5

4.4.2 Biz/ed (for homepage see Fig. 3 Appendix B)

‘Biz/ed is run by the Institute for Learning and Research Technology at the University of Bristol. It contains over 2900 resource descriptions and is a ‘unique business and economics service for students, teachers and lecturers.’ (Biz/ed website, 2002). The term ‘service’ would suggest that an Internet catalogue is only one part of what this site has to offer.

Biz/ed: Level of resource description:

An indepth paragraph is given for each resource covering its content and scope. Non-hyperlinked keywords are also provided. Intended audience is given for some entries.

Rating: 5

Biz/ed: Level of resource evaluation:

Resource evaluation is excellent with full details of the website, details of the author and indepth coverage of the content provided. Where applicable other details are given such as the need to subscribe or the size of a downloadable file.

Rating: 5

Biz/ed: Guide design:

The design of the Gateway is clear and uncluttered with a black and grey background and a consistent blue colour to certain text elements throughout. There are no animated graphics. There is a search facility, but no advanced search. Browsing is available below the search box on the home page.

Rating: 5

Biz/ed: Guide meta-information:

The aim of Biz/ed is stated on the homepage with an indication of potential users and the coverage areas. Biz/ed staff are listed on the 'contact us' page but there are no further details about the authors. There is one contact email which asks for 'positive feedback' or notification of errors. No indication of update frequency was found.

Rating: 4

Biz/ed: Other services:

Other facilities offered include learning materials, data, company facts and virtual worlds. The site also contains a virtual training suite, a focus on Europe section, discussion forums and an online directory of business and management courses.

Rating: 5

4.4.3 ADAM (for homepage see Fig. 4 Appendix B)

ADAM is run by a team from the Surrey Institute of Art and Design and the Glasgow School of Art Library. It contains over 2000 resource descriptions and is the 'gateway to art, design, architecture and media information on the Internet.' (ADAM website, 2002). The service will shortly be taken over and run by the Arts and Creative Industries (ACI) Hub, so ADAM in its current form will not be available for much longer, although no time scale was given on the web site. As a result further development of the site has been suspended and all areas of the site other than the search engine are unavailable.

ADAM: Level of resource description:

An indepth paragraph is given for each resource. Intended audience is not given on the selected descriptions, although the home page states that the service is for the 'benefit of the UK Higher Education community.' (ADAM website, 2002).

Rating: 5

ADAM: Level of resource evaluation:

Comprehensive description and evaluation is given for resources. Usability is covered, giving details of the need to subscribe, etc., where applicable. Technical details are also provided where needed (the need to enable a shockwave Flash plugin, for example).

Rating: 5

ADAM: Guide Design:

The design is clear and uncluttered with a white background and one unobtrusive animated graphic on the home page. A consistent colour scheme is used throughout. Navigation is through search or browse which are both extensive. Search allows simple searching, field searching, advanced and proximity searching and a 'what's new' search. Browse allows simple browsing, multioption browsing (combining of topics) and place name browsing.

Rating: 5

ADAM: Guide meta-information:

Aims and subject coverage are covered in detail. A collection policy and selection guidelines are also available. The ADAM team is listed, with contact details for each.

No update frequency is available.

Rating: 4

ADAM: Other services:

There are no other services offered by the ADAM Gateway.

Rating: 0

4.4.4 EEVL (for homepage see Fig. 5 Appendix B)

EEVL is run by a partnership between Heriot Watt University, the University of Birmingham, Cranfield University and the University of Ulster. It has over 9000 resource descriptions and is 'the Internet guide to Engineering, Mathematics and Computing.' (EEVL website, 2002).

EEVL: Level of resource description:

A full descriptive paragraph is given for each resource. Intended audience is sometimes given and the target audience is stated in the 'about' link.

Rating: 5

EEVL: Level of resource evaluation:

Records are indepth, giving details such as available downloads and required registration. Authority is sometimes stated in the description or given as a publisher in the 'full record' view. The user is given a chance to comment on a record through

an email link. Records are also scored, although it was difficult to ascertain what the ranking system for the score was.

Rating: 5

EEVL: Guide design:

The design of this Gateway is clear and uncluttered with a white background and a consistent green colour used throughout. There are no animated graphics. EEVL does have sponsors and some logos are shown at the end of pages, but they are unobtrusive. Navigation is provided through search and browse facilities, both available on the home page. Search allows you to search for the exact word or words in title only. There is also a 'key site' search which is a subset of the EEVL catalogue. There is also a search facility which allows the user to search within the listed sites which 'permits deeper and more extensive searching.' (EEVL website, 2002).

Rating: 5

EEVL: Guide meta-information:

The mission and aims are clearly stated in 'about.' Details of authors and contact information are also provided. No information on update frequency could be found.

Rating: 4

EEVL: Other services:

Other facilities include: what's new, top 100, literature searching resources, current awareness, news, events, jobs, teaching resources, University Science and Technical Librarians Group, resource finder, web tutorials and subject launch pad.

Rating: 5

4.4.5 OMNI (for homepage see Fig. 6 Appendix B)

OMNI is a 'guide to quality Internet resources in health and medicine.' (OMNI website, 2002). It is one of a number of Gateways offered under the hosting service of BIOME. It is run by subject experts at the University of Nottingham Greenfield Medical Library in partnership with other key organisations and it describes over 6000 resources.

OMNI: Level of resource description:

A full descriptive paragraph is given for each resource. Intended audience is sometimes given in the description, but in 'about' it clearly states that it is aimed at 'students, researchers, academics and practitioners in the health and medical sciences.' (OMNI website, 2002).

Rating: 5

OMNI: Level of resource evaluation:

The descriptions are full and indepth, giving technical information when applicable (such as the format in which a document is presented and the need for specific software). Authority is sometimes given in the description.

Rating: 5

OMNI: Guide design:

Design is clear and uncluttered with a white background, a consistent blue used for graphic elements throughout and no animated graphics. Navigation is through search or browse. Search has an 'advanced search' facility.

Rating: 5

OMNI: Guide meta-information:

The OMNI mission is not immediately clear or stated in 'about.' It does describe what the Gateway is and which subjects are covered. Details of authors are not available specifically for OMNI. There is one email contact facility. Update frequency is given.

Rating: 3

OMNI: Other services:

Additional features offered include: partnerships in health and information and consumer health information consortium. Other services are also offered through BIOME and include mailing lists, Internet medic tutorial, medicine page, Internet resources for nurses, midwives and health professionals and job opportunities.

Rating: 5

4.5 AERADE (for homepage see Fig. 7 Appendix B)

AERARDE, as previously discussed, is a 'portal to quality aerospace and defence resources on the Internet.' (AERADE website, 2002). It has over 2000 links and is run by subject specialists at Cranfield University and the Royal Military College of Science Library.

AERADE: Level of resource description:

A paragraph of description is provided for each resource. Intended audience is not given in descriptions although the target audience is stated in 'about.'

Rating: 5

AERADE: Level of resource evaluation:

Detailed description is provided for each resource. Technical details, such as software requirements, are given where applicable. Authority is sometimes provided in the description.

Rating: 5

AERADE: Guide design:

The design of the site is clear and consistent with a white background and coloured text boxes on the home page and a consistent colour scheme throughout. Navigation around the catalogue is by a search or browse facility. Search includes Boolean searching and 'Portal search' which allows the user to search the different services simultaneously. Browse is available alphabetically or by subject.

Rating: 5

AERADE: Guide meta-information:

The AERADE mission is available in 'About.' Scope of the contents of the site is also given. AERADE team members names and details of their contributions to the project are also provided. There is one contact email. There is no update frequency given.

Rating: 4

AERADE: Other services:

AERADE also offers DEVISE which is a special collection of military resources, the ESDU series which are abstracts for engineering design, Internet Aviator which is an Interactive Internet tutorial and news services.

Rating: 5

4.6 Internet directories

The two Internet directories chosen for this research are Yahoo.com and Open Directory. They were chosen as they are listed by Search Engine Watch as amongst the largest Internet directories. (Search Engine Watch website, 2002).

4.6.1 Yahoo

Yahoo was founded in 1994 and is now 'the Internet's leading global consumer and business service company.' (Yahoo overview, 2002). It has over 1.8 million links and is run as a corporate business.

Yahoo: Level of resource description:

A sentence of description is provided for each resource. No intended audience is given.

Rating: 3

Yahoo: Level of resource evaluation:

Although the description is very brief it is informative and gives the main content of the resource. Usability is not addressed. Authority is sometimes given.

Rating: 3

Yahoo: Guide design:

The design is clear with a white background and consistent colours throughout. There are no animated graphics and any graphics used are small and unobtrusive. There are advertisements but they do not appear to be too obtrusive. Navigation is through search or browse, both available from the home page. Search contains an advanced or 'most popular' search.

Rating: 5

Yahoo: Guide meta-information:

Mission and aims are clearly stated on the 'company information' pages. Corporate headquarters address and telephone numbers are provided. No update frequency is given but new additions to the directory are listed by date and number.

Rating: 4

Yahoo: Other services:

This is Yahoo's strongest aspect. There are wealth of other facilities available from the home page including jobs, shopping, chat services, games, news, email and a personalising facility.

Rating: 5

4.6.2 Open Directory:

Open Directory is 'the largest, most comprehensive human-edited directory on the web.' (Open Directory website, 2002). It uses the directory services of other search engines. It is run by Netscape Communication Corporation and is volunteer managed and developed. It is an open source which is free and downloadable.

Open Directory: Level of resource description:

The resource description is one or two sentences long. No intended audience is given.

Rating: 3

Open Directory: Level of resource evaluation:

As the descriptions are so brief there is no real depth to the descriptions, however, some are incisive, giving the essence of the resource described. Usability is not addressed. Authority is sometimes given.

Rating: 3

Open Directory: Guide de sign:

Design of the site is clear and uncluttered with a white background, consistent colour scheme and no animated graphics. There are no advertisements. Navigation is

through search or browse, the search facility has an advanced search, browse is available from the home page subject listings.

Rating: 5

Open Directory: Guide meta-information:

The mission, aims and objectives of the project are clearly stated in the 'about' pages.

The only information on authors is that they are 'net-citizens' who are volunteers.

Authors cannot be contacted. There is a feedback form that can be sent to Open Directory staff. No update frequency is available.

Rating: 2

Open Directory: Other services:

No other services are available.

Rating: 0

Fig. 1: Results table :

Name	Authority	Links	Level of resource desc.	Level of resource eval.	Design	Meta-info	Other	Total (max. 25)
SOSIG	Uni. of Bristol	1000s	5	5	5	4	5	24
Biz/ed	Uni. of Bristol	Over 2900	5	5	5	4	5	24
ADAM	Surrey Inst. of Art, Glasgow School of Art Lib.	Over 2000	5	5	5	4	0	19
EEVL	Heriot Watt Uni., Uni. of Bham., Cranfield Uni., Uni. of Ulster	Over 9000	5	5	5	4	5	24
OMNI	Uni. of Notts. Greenfield Med. Lib.	Over 6000	5	5	5	3	5	23
AERAD E	Cranfield Uni., RMCS Lib.	Over 2000	5	5	5	4	5	24
Yahoo	Yahoo.com	Over 1.8 million	3	3	5	4	5	20
Open Directory	Netscape	Over 2.6 million	3	3	5	2	0	13

4.7 Discussion:

It is clear from the results that the quality of all the Subject Gateways is high; the one aspect where points were consistently lost was in meta-information. ADAM scored zero on 'other services' but this is undoubtedly because ADAM is no longer being developed and will presumably expand when the new service is underway.

Alternatively it could be that ADAM was conceived solely as a Subject Gateway (as is the case with Open Directory) and will not offer other services, preferring to concentrate on the main task of cataloguing relevant web sites. However, it seems clear that extra services have become and will continue to be an important aspect of Gateways. Many services are tailored to the particular market, such as career services. Some offer email updates which keep the user informed of new developments on the site and provide other news. Some offer teaching and learning resources. These extra services may provide the 'hook' needed to keep users and to ensure the continuation of the service.

Continuation of the services is obviously an important aspect to consider. As the literature has highlighted, outside funding for Gateways cannot be relied upon indefinitely and other forms of income may have to be sourced. While this is not a problem for a service such as Yahoo, which is run as a corporate business and can rely on advertising revenue to sustain the service, this is a problem for academic Subject Gateways. It is clear, however, that sponsorship is one direction in which Gateways are looking for sustainable revenue. EEVL has sponsorship details on its site, and has sponsor logos on its pages. This did not seem obtrusive or detract in any way from the excellent service provided. The future problem may be how far to take such a strategy – would 'pop-up' or banner advertising be acceptable? Would advertisers

want a say in what kind services were offered? Would there be discrimination in the kind of advertising or sponsorship accepted? It is clearly an area that will develop in the future as Gateways lose central funding and have to look to alternatives.

The level of resource description and evaluation was consistently high for the Subject Gateways. This is to be expected as they are all selected and described by subject specialists. This is, of course, a very strong aspect of Gateways and the reason they were originally created. In contrast the web directories scored low marks on the resource descriptions and evaluations. Their descriptions were extremely brief, consisting of one or, at the most, two sentences. As Dochartaigh points out in relation to a Gateway, 'the less description of links it provides, the less useful it is.' (Dochartaigh, 2002).

Another problem with web directories is the fact that authors of the descriptions are unidentifiable. They are not necessarily subject specialists and cannot be absolutely relied upon to be unbiased or even to give an accurate account of the contents of a Web site.

The strength of the RDN Gateways and of AERADE is that they are focused on particular narrow subject areas and they concentrate on those areas to the exclusion of others. In contrast the web directories attempt comprehensiveness and try to cover all areas. This, while ensuring greater quantity (over 2.6 million descriptions on Open Directory as opposed to thousands for the Subject Gateways) will undoubtedly mean less quality.

If Subject Gateways are to continue in the face of competition from web directories and web search engines then the question of their value to their community and to the wider community should be addressed. Yahoo offers many other services apart from its directory. The directory itself covers all areas including business, news, entertainment, recreation, health, government, society, education, arts, science, social science and reference. This broader coverage will undoubtedly be more useful to the wider community than a focused Gateway such as EEVL, for example. However, the narrow focus of Subject Gateways will be of more use to the academic community, and of use to the wider community when they need information in that particular area.

Dochartaigh explains why Subject Gateways are so useful to researchers:

Research involves an exploration of a broad area of knowledge, an exploration of what has been written and is being written in that area. The best starting point for such an exploration of the open web is subject guides. (Dochartaigh, 2002).

As he states: ‘as far as academic research is concerned the future lies with subject searching.’ (Dochartaigh, 2002). It is clear then, that Subject Gateways have a place in the ‘market’ – it is up to the managers and developers of those Gateways to ensure that the user base is offered enough in the way of quality resource descriptions and ‘other services’ to secure long term sustainability.

5. AERADE Evaluation

AERADE was launched in November 1999 as a quality Subject Gateway of aerospace and defence information on the Internet. It originated from the amalgamation of two already existing services, from where it drew its initial records: CRUISE (Cranfield University Internet Site Explorer), which focused on the subjects researched and taught at the Cranfield Campus (Harrington, 1999) and DEVISE (Defence Virtual Information Service at Cranfield University at Shrivenham). The service was relaunched in October 2000 with four extra services: ESDU (abstracts of the Engineering Science Data Unit), DEVISE, Internet Aviator (a set of online Internet tutorials) and Newsbrief. AERADE was developed in partnership with the EEVL (Edinburgh Engineering Virtual Library) web portal and provides the aerospace and defence engineering catalogue records for that portal. Records within EEVL that have been provided by AERADE are stamped with the AERADE logo.

The service was devised and is maintained by a team of subject specialists from Cranfield University Library and the Royal Military College of Science Library. The Gateway was created using ROADS version 2 software to 'ensure the interoperability of AERADE with EEVL and other existing gateways due to its usage of the IAFA template format and the WHOIS++ protocol.' (Cranfield University, 1998). Copernic software is used to identify relevant resources and MINDIT is employed to maintain the database. Dublin Core is used for the creation of metadata.

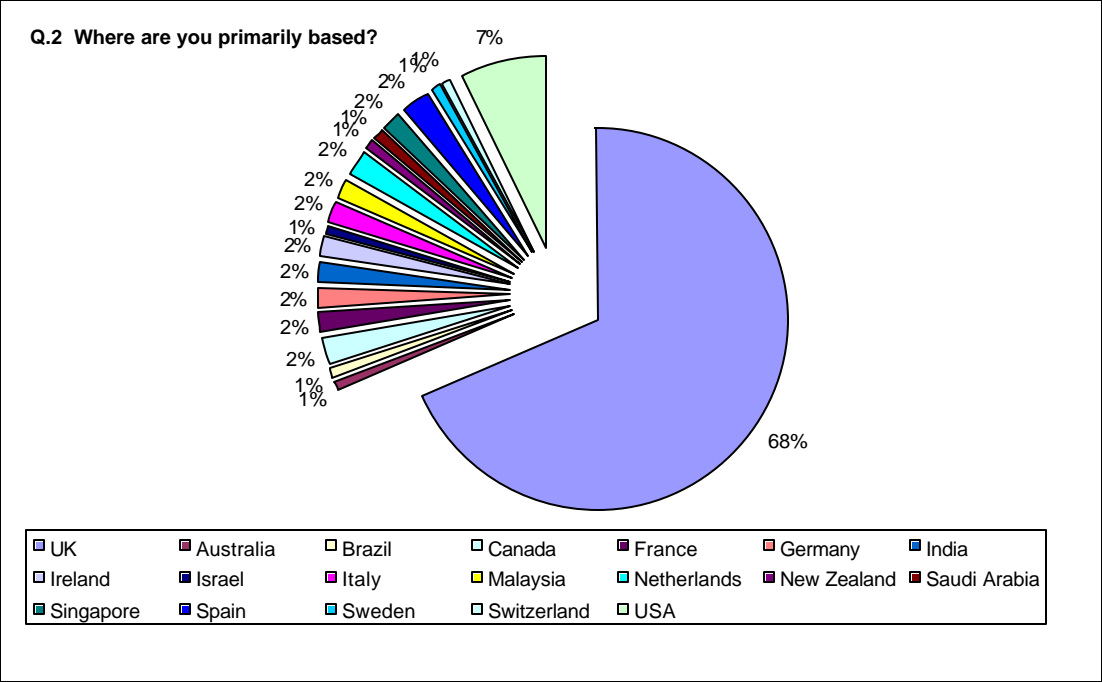
Returns from the paper survey amounted to 21.3% (32 paper surveys received), which was disappointingly low. Some reasons for this low response could include the time of year, being close to Christmas, and demands on students' time with looming

deadlines for assignments. There were 91 online returns, which, in contrast to the paper survey, was a good response.

The following section illustrates the results of both the paper and online survey using exploded pie representation for each questions. Data tables are also included to provide precise information on the exact number of returns and responses for each question. Free text answers to the open questions are given in full as they appeared on the responses.

Q.1 *What is your primary role?*

Post graduate students have made up the majority of the respondents to this questionnaire (34%), with undergraduates (11%) coming second. This is hardly surprising: AERADE is run by Cranfield University and is available as a link from the library Web sites of both Cranfield and RMCS. However, it is clear from the responses that there is a much wider audience for the Web Portal than students alone. The variety of users illustrated here could perhaps indicate future directions for AERADE and a consideration of the needs and requirements of that wide user base may help to expand the content of the Portal in directions that were perhaps not considered in the past.

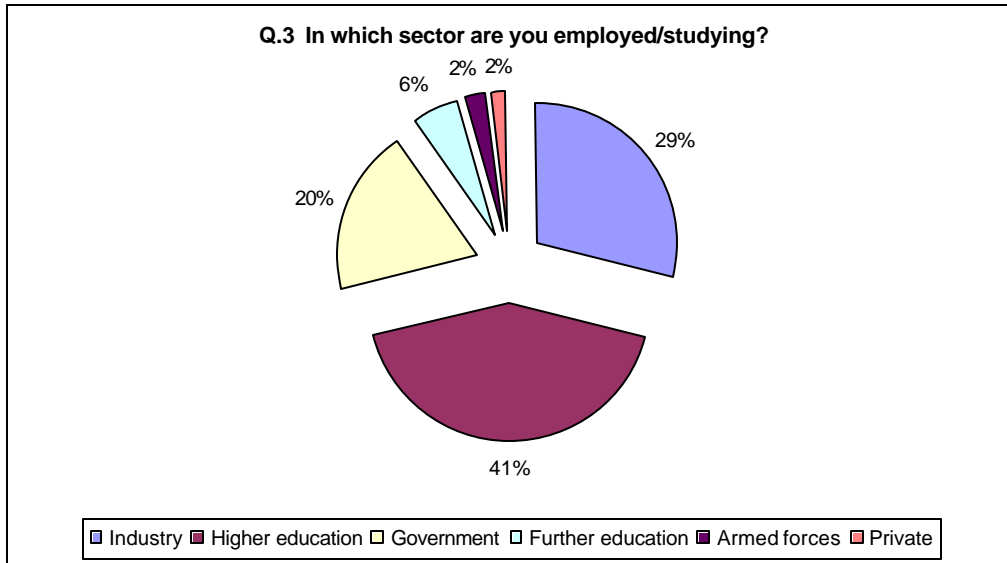


Data table Q. 2:

UK	84
Australia	1
Brazil	1
Canada	3
France	2
Germany	2
India	2
Ireland	2
Israel	1
Italy	2
Malaysia	2
Netherlands	3
New Zealand	1
Saudi Arabia	1
Singapore	2
Spain	3
Sweden	1
Switzerland	1
USA	9

Q.2 *Where are you primarily based?*

68% of users were based in the UK, with 7% coming from the United States of America. However, it is clear that AERADE has world wide appeal. There were 19 countries cited in the replies to this question. This raises the question of whether AERADE should offer some kind of translation service, thus perhaps widening even further its international audience.

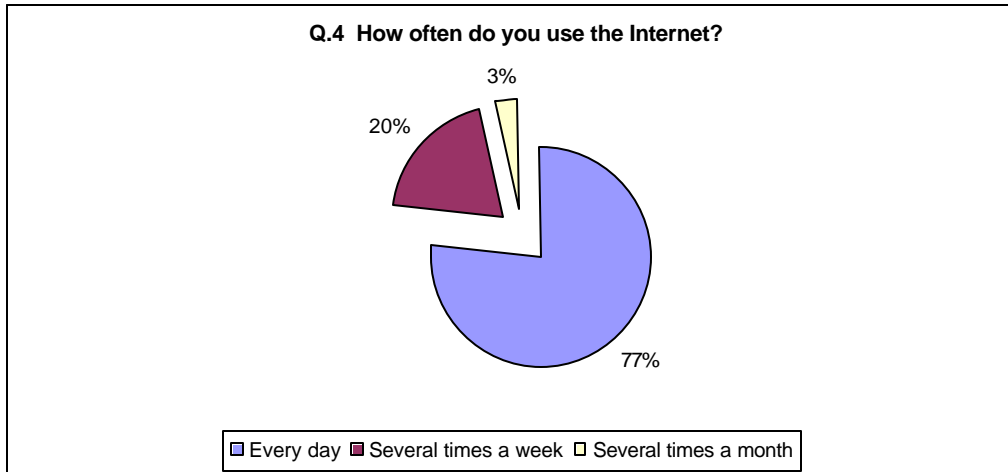


Data table Q. 3:

Industry	36
Higher education	51
Government	24
Further education	7
Armed forces	3
Private	2

Q.3 In which sector are you employed/studying?

Higher education naturally came first in responses to this question (41%) as the majority of responses were from students. However, there were also high responses from both industry (29%) and government (20%). This could indicate that AERADE plays an important role in all of these sectors and perhaps new or expanded services could be offered tailor made for these sectors.

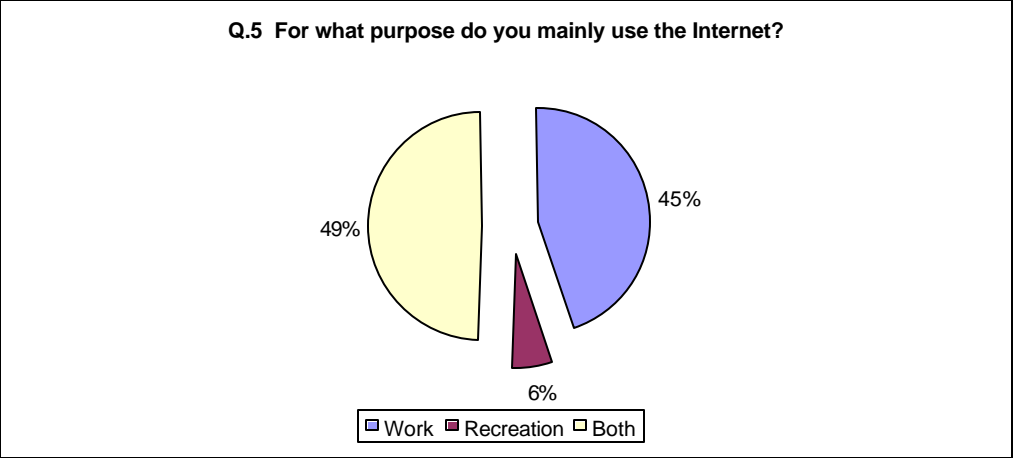


Data table Q. 4:

Every day	94
Several times a week	25
Several times a month	4

Q.4 How often do you use the Internet?

77% replied that they use the Internet every day, while 20% use it several times a week. This illustrates the growing importance of the Internet in our information structure and the preference that people now have for finding information online. The importance of the Internet was certainly made obvious from the literature, and any voices of dissent as to its importance and popularity can certainly be silenced by this result of 77% of users accessing the Internet daily.

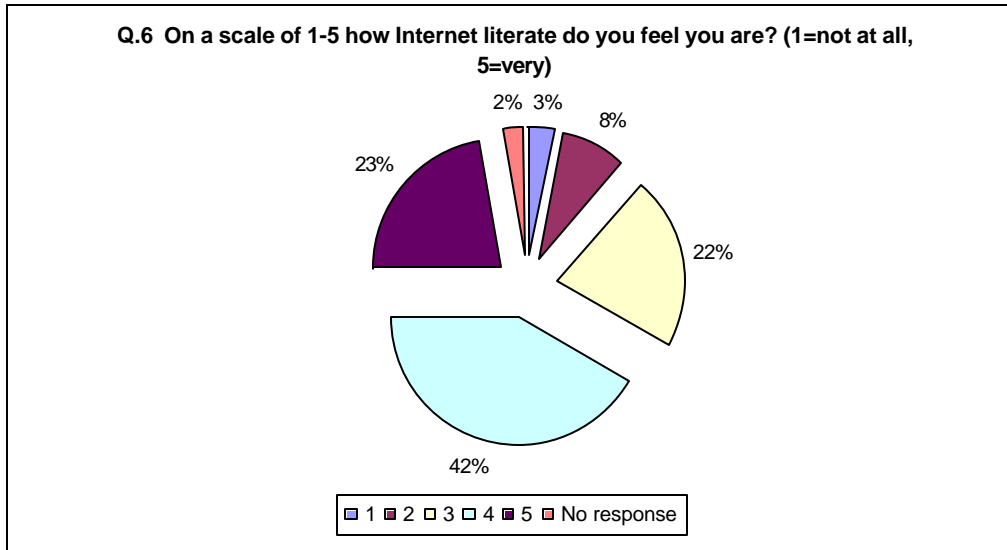


Data table Q. 5:

Work	55
Recreation	7
Both	61

Q.5 For what purpose do you mainly use the Internet?

45% stated that they use the Internet mainly for work while 6% indicated that they use the Internet mainly for recreation. The majority of respondents (49%) stated that they use the Internet for both work and recreation which again illustrates the pervasive nature of the Internet in today's society. It is used as both a tool for research and information finding, and as a means for recreation. This emphasises the need for quality tools for finding information amongst the huge number of sites that are now available online and the important role that subject gateways like AERADE are playing in the online information market.

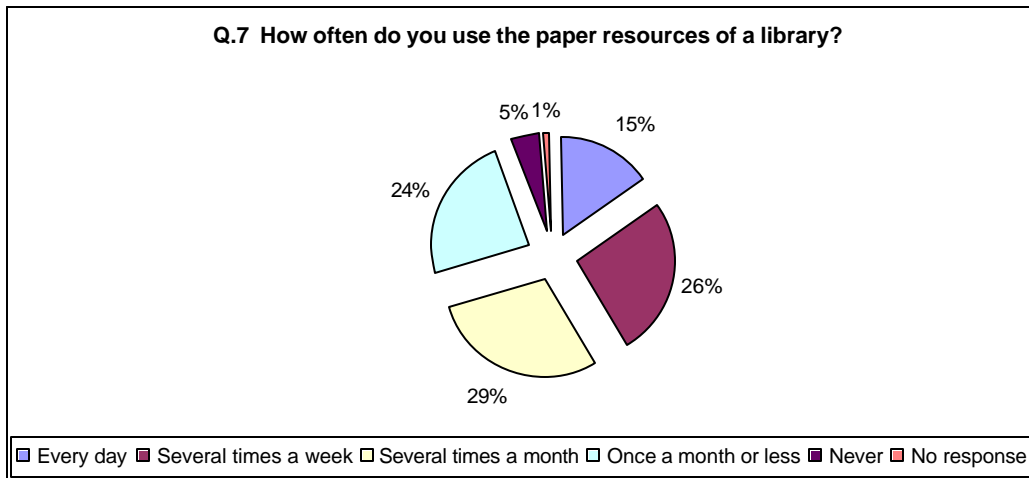


Data table Q. 6:

1	4
2	10
3	27
4	51
5	28
No response	3

Q.6 On a scale of 1-5 how Internet literate do you feel you are? (1= not at all, 5=very)

The majority of respondents (42%) put themselves at 4 on the 1-5 scale, with only 3% feeling that they were ‘not at all’ Internet literate and 23% feeling ‘very’ Internet literate. While the high number of respondents putting themselves at point 4 on the scale is not really surprising considering that the majority of replies were from students, the responses could still be seen to indicate that the vast majority of people now feel at ease with the Internet and with finding information online.

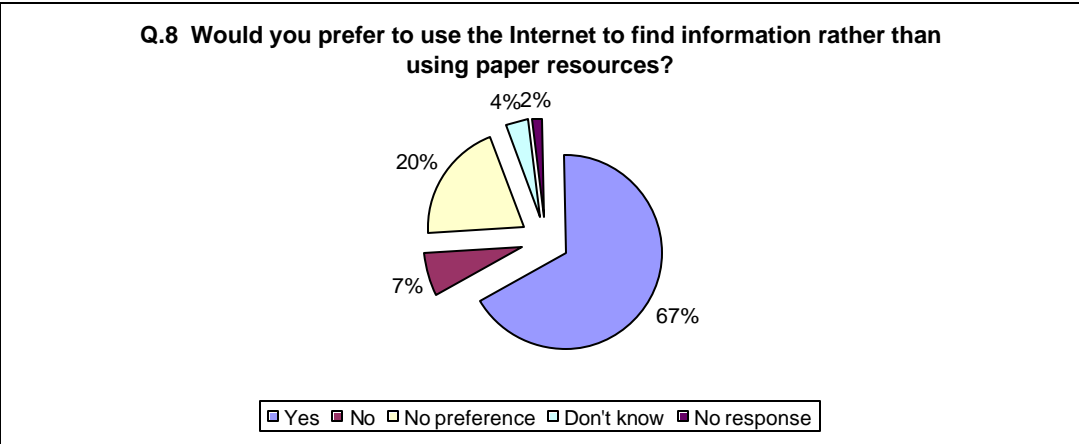


Data table Q. 7:

Every day	19
Several times a week	32
Several times a month	35
Once a month or less	30
Never	6
No response	1

Q.7 How often do you use the paper resources of a library?

15% stated that they use a library every day. Every day usage can be understood as a large number of students responded to the questionnaire. Several times a week, several times a month and once a month or less were all in the 20-30% range. It would appear, then, that libraries are still well frequented and used for their paper resources, only 5% of respondents stated that they never use a library.

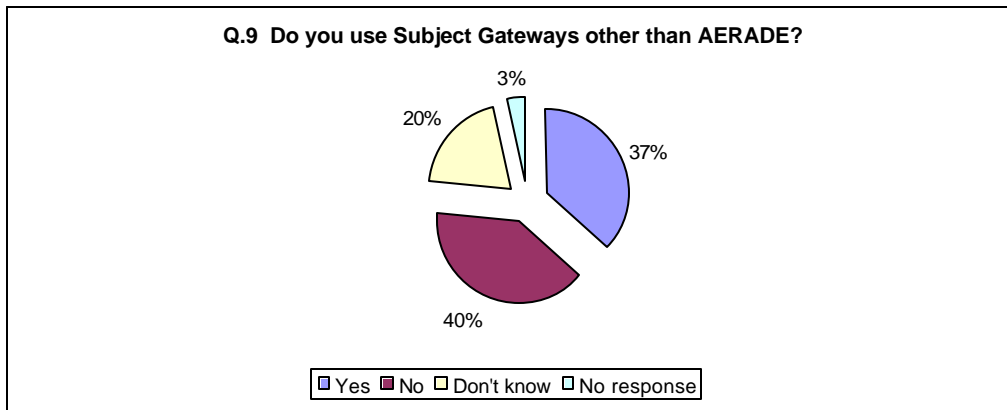


Data table Q. 8:

Yes	82
No	9
No preference	25
Don't know	5
No response	2

Q.8 Would you prefer to use the Internet to find information rather than using paper resources?

An overwhelming 67% of respondents stated that they would rather use the Internet to find information than use paper resources. This again illustrates the growing importance of the Internet in society and as an information tool, and again illustrates the need for the Internet to be ‘tamed’ by good quality gateways such as AERADE where sites are catalogued, evaluated and checked by information specialists using quality criteria.

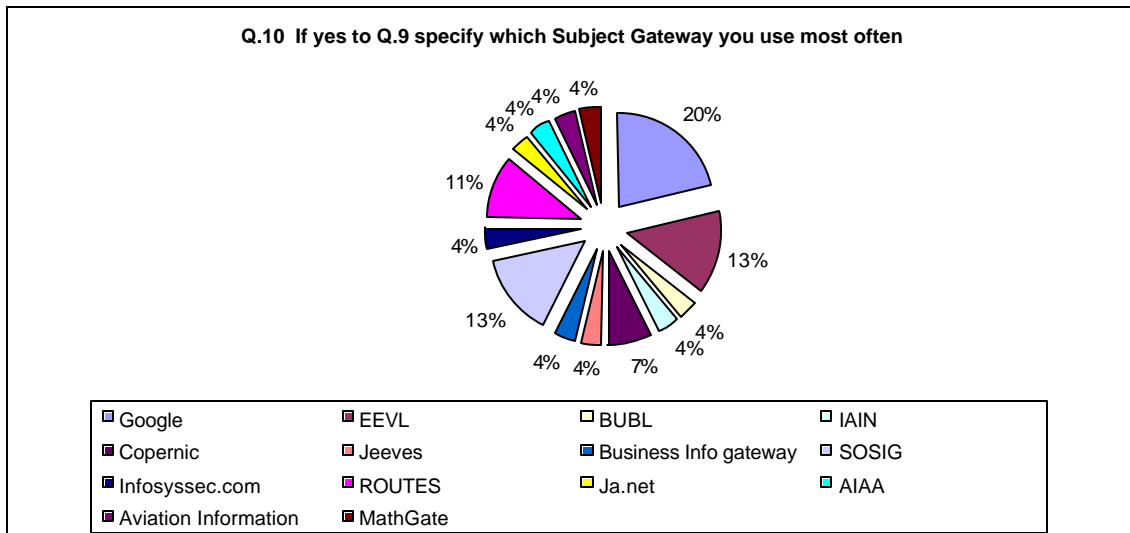


Data table Q. 9:

Yes	45
No	49
Don't know	25
No response	4

Q.9 Do you use Subject Gateways other than AERADE?

40% of respondents stated that they do not use other Subject Gateways apart from AERADE. This would seem to suggest that they are finding all they need from AERADE without the necessity of turning to other aerospace gateways. 20% of respondents indicated that they did not know whether they used other gateways, which could suggest that there is a confusion concerning terminology between, for example, a Gateway in comparison to a Portal or a Search Engine. So, whilst most respondents felt a certain degree of Internet literacy, the terminology of the Internet does not seem important to them.



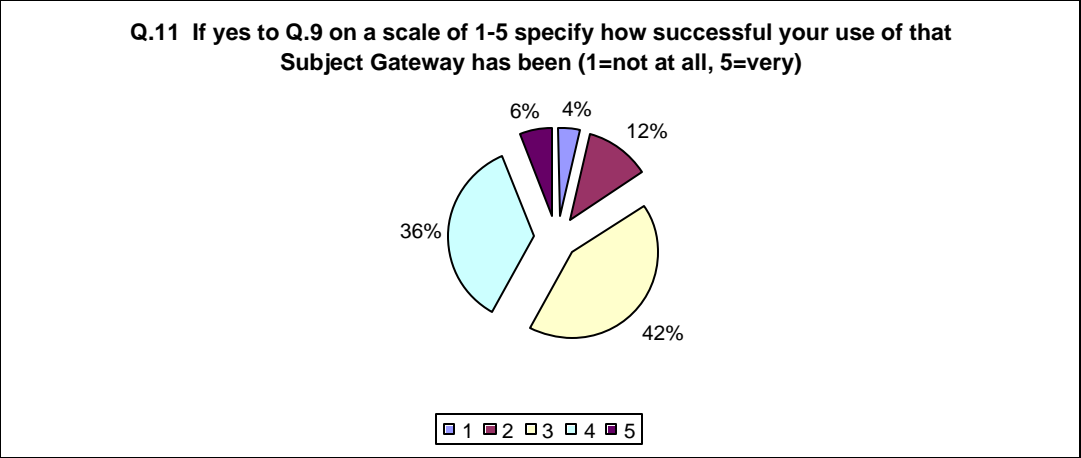
Data table Q. 10 (28 respondents):

Google	6
EEVL	4
BUBL	1
IAIN	1
Copernic	2
Jeeves	1
Business Info gateway	1
SOSIG	4
Infosyssec.com	1
ROUTES	3
Ja.net	1
AIAA	1
Aviation Information	1
MathGate	1

Q.10 If 'yes' to Q.9, specify which Subject Gateway you use most often

Responses to this question again illustrate the confusion that users encounter when dealing with Internet terminology. 20% of respondents stated that Google was the Subject Gateway used most often, but Google is a Search Engine, as is Jeeves, another Search Engine cited by respondents. It would appear that users see little difference between Search Engines and Subject Gateways, they use both to search the Internet for relevant information. However, there is a vast difference. Subject Gateways are

selective and use quality evaluative criteria to decide which sites to include in their database, whereas Search Engines generally do not take into account any qualitative or evaluative standards in their selection of sites presented to the searcher. This is an important point that it would seem is not totally understood, even by those who would rate themselves as 'very' Internet literate. Perhaps this is a factor that should be more widely publicised by AERADE. If users realise that they are more likely to find good quality information using the Subject Gateway than using a Search Engine, they would, of course, be more likely to come back.

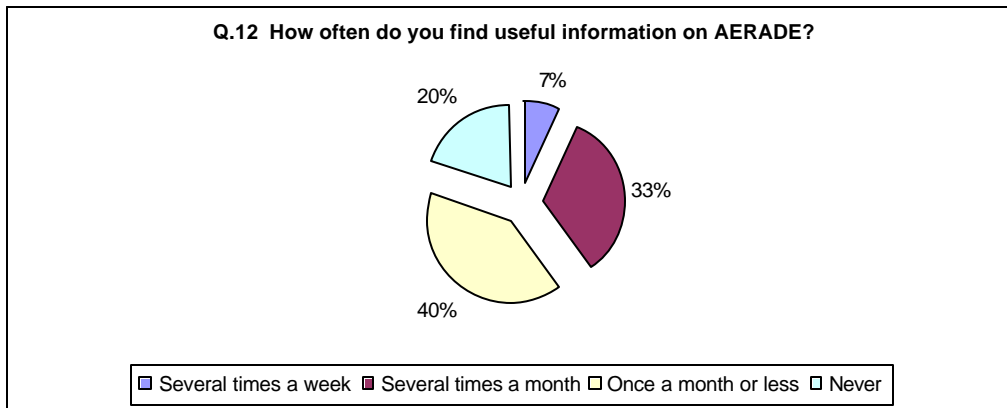


Data table Q. 11 (50 respondents):

1	2
2	6
3	21
4	18
5	3

Q.11 *If 'yes' to Q.9, on a scale of 1-5 specify how successful your use of that Subject Gateway has been. (1=not at all, 5=very).*

42% rated their success of using their specified Subject Gateway at point 3 of the scale, and 36% at point 4. It would seem that the majority, then, are satisfied with their use of other Subject Gateways (or Search Engines).

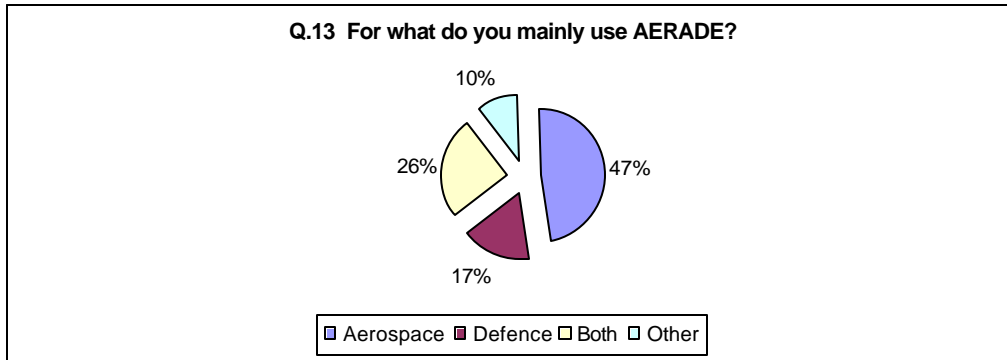


Data table Q.12 (85 respondents):

Several times a week	6
Several times a month	28
Once a month or less	34
Never	17

Q.12 How often do you find useful information on AERADE?

The majority of respondents (40%) state that they find useful information on AERADE once a month or less, 33% find useful information several times a month, 7% find useful information several times a week and 20% state that they never find useful information on AERADE. 80% of respondents, then, state that they are finding information that is useful to them in their study or in their employment from AERADE. There may be many reasons why 20% are not finding the information they need on AERADE, and understanding exactly what AERADE has to offer may be one problem that users need to overcome. If their other main Subject Gateway used is, for example, BUBL, SOSIG or a business information gateway, they are going to contain information very different in nature from AERADE. Perhaps a clearer indication of exactly the types of information and Internet sites available could be displayed on the AERADE home page?

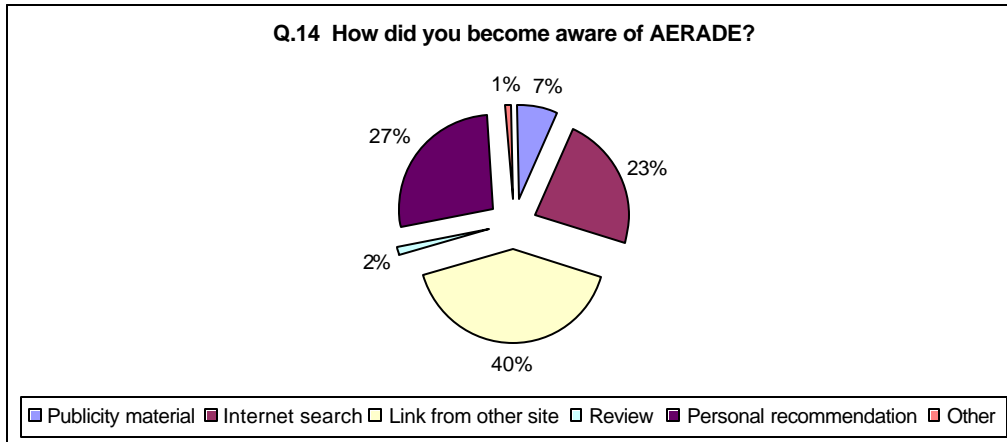


Data table Q. 13 (89 respondents):

Aerospace	42
Defence	15
Both	23
Other	9

Q.13 For what do you mainly use AERADE?

As would be expected, the majority (47%) of respondents use AERADE for aerospace information, 17% use it mainly for information on defence, 26% use it for both and 10% stated that their main use of AERADE was for other than aerospace or defence information. The high usage for aerospace information may reflect the content of AERADE at the moment. Because there is a large amount of aerospace information on the database, people know they can rely on it to provide them with good quality information in this area. However, there is obviously a need to provide quality defence information, and perhaps an expansion of the number of these sites on AERADE would attract a larger audience. 10% are using it for ‘other.’ While it is impossible to know what, exactly, they are hoping to find on AERADE, it is clear that people are using it to find information not purely based on aerospace and defence. Perhaps an expansion into other areas could be considered, and may again attract a larger audience.



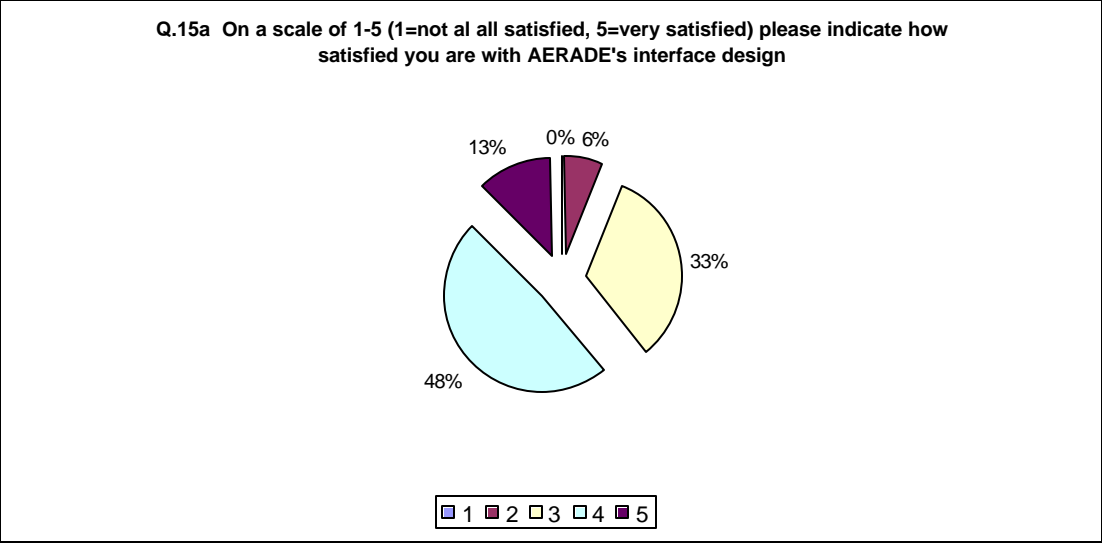
Data table Q.14 (100 respondents):

Publicity material	7
Internet search	23
Link from other site	40
Review	2
Personal recommendation	27
Other	1

Q.14 How did you become aware of AERADE?

The majority of respondents (40%) became aware of AERADE through a link from another site. This, then, is an important means for publicity and should be exploited as far as possible. Perhaps every site that is included in the AERADE database should be sent an AERADE logo which could be displayed on their Web site and which could link to AERADE. 27% became aware of AERADE through personal recommendation. In academic environments this very often happens: tutors will recommend that students use a certain site, therefore it might be useful to send publicity material to academics at universities and academic institutions which have aerospace/defence/engineering courses (if this has not already been done). Industry, too, could be targeted with publicity material. 23% of respondents came across AERADE during an Internet search. AERADE has undoubtedly already been

registered with all of the major Search Engines, and this would account for the number of hits from Internet searches. Publicity material accounted for 7% of respondents finding out about AERADE. This is something which again could be exploited in the marketing strategy and should perhaps be followed up each time a new aspect to AERADE is developed, although cost would have to be taken into account and may be prohibitive.

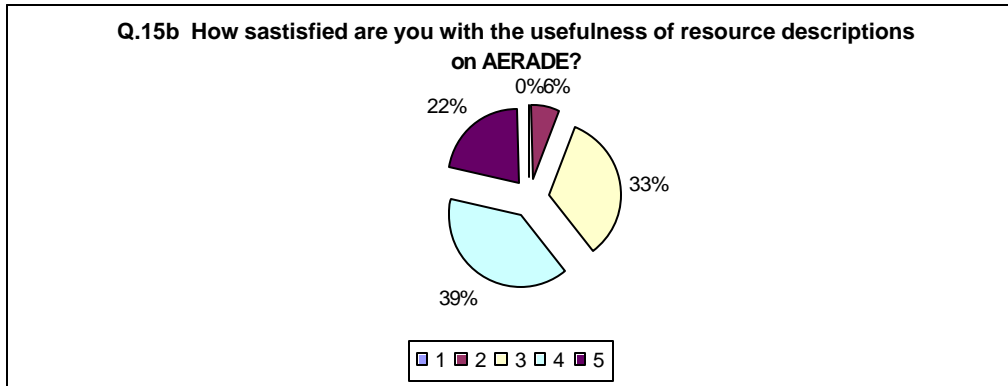


Data table Q. 15a (64 respondents):

1	
2	4
3	21
4	31
5	8

Q.15a On a scale of 1-5 (1=not at all, 5=very) please indicate how satisfied you are with AERADE's interface design

48% of respondents rated their satisfaction level with the interface design of AERADE at point 4 on the scale. This high percentage indicates that the majority of users are towards the very satisfied end of the scale, and that the interface design of AERADE is pleasing to users. 33% rated their satisfaction level at point 3, which again would indicate that they are satisfied with the interface design. 13% rated their level at the highest point on the scale, while the lowest rating was 2, which only 6% of respondents chose. It would seem that the interface design is well received amongst AERADE users.

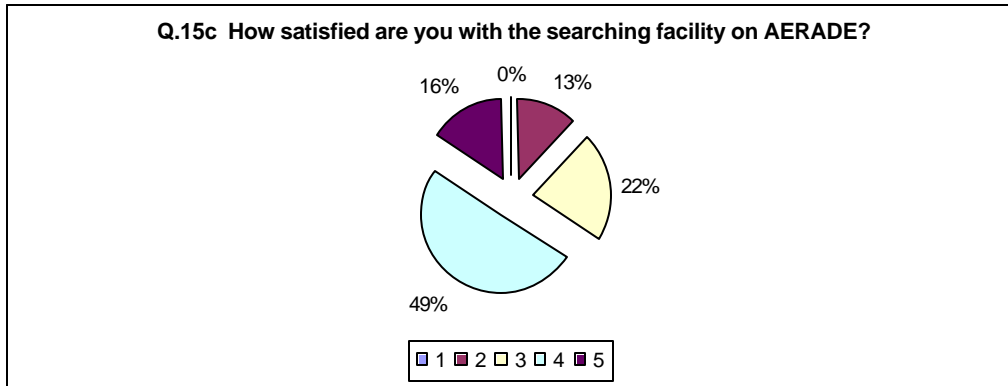


Data table Q. 15b (64 respondents):

2	4
3	21
4	25
5	14

Q.15b *On a scale of 1 -5 (as above) how satisfied you are with the usefulness of resource descriptions on AERADE?*

33% rated their satisfaction level at point 3 on the scale and 39% at point 4. 22% rated it at the highest point, point 5 while the lowest rating was point 2, which only 6% chose. 94% of respondents, then, rated their satisfaction of AERADE's resource descriptions at point 3 or above on a 5 point scale, which indicates very strongly that the resource descriptions are extremely important to users of AERADE. It would also seem to indicate that the quality of resource description is excellent.

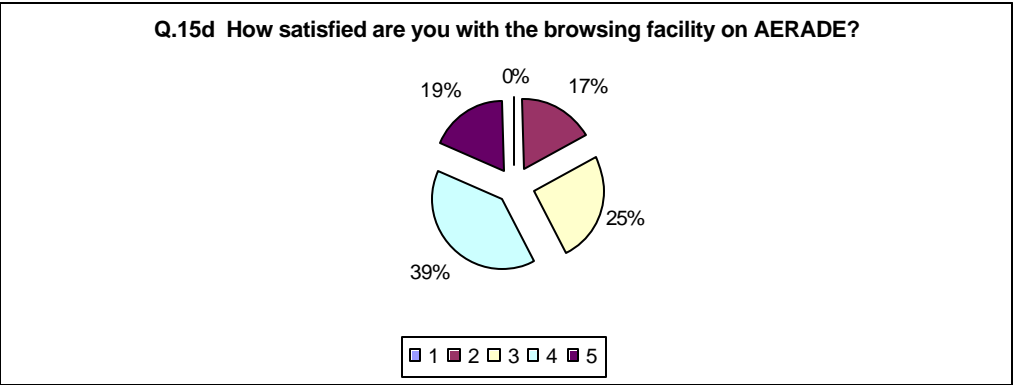


Data table Q. 15c (64 respondents):

2	8
3	14
4	32
5	10

Q.15c *On a scale of 1-5 (as above) how satisfied are you with the searching facility on AERADE?*

22% of respondents rated their satisfaction level with AERADE's search facility at point 3 on the scale, 49% at point 4 and 16% at point 5, while 13% rated it at point 2. 87% of respondents were satisfied or very satisfied with the searching facility.

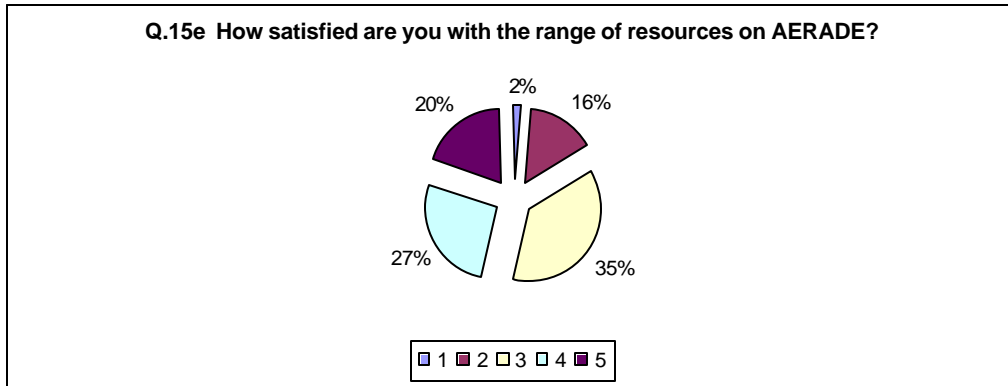


Data table Q. 15d (64 respondents):

2	11
3	16
4	25
5	12

Q.15d *On a scale of 1-5 (as above) how satisfied are you with the browsing facility on AERADE?*

25% rated their satisfaction level with AERADE’s browse facility at point 3, 39% at point 4 and 19% at point 5. 17% rated it at point 2. 83% rated it at 3 or above. This is slightly, but not significantly, lower than the satisfaction levels with AERADE’s search facility.

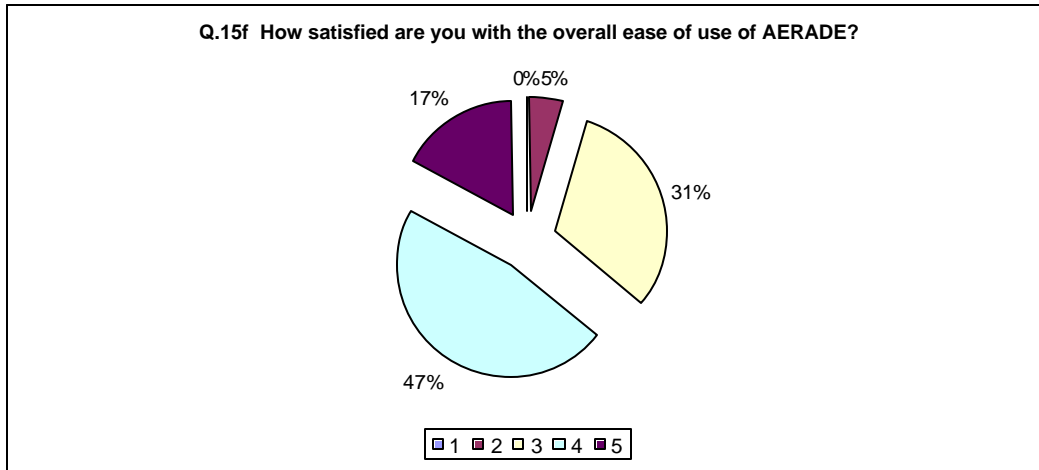


Data table Q. 15e (64 respondents):

1	1
2	10
3	23
4	17
5	13

Q.15e *On a scale of 1-5 (as above) how satisfied are you with the range of resources on AERADE?*

35% rated their satisfaction level with this aspect at point 3, 27% at point 4 and 20% at point 5. 2% rated it at point 1 and 16% at point 2. 82% rated at point 3 or above, 18% at point 2 or below. A higher percentage of respondents rated this aspect at point 3 than the previous rateable questions, and a higher percentage rated it at point 2 or below. This might suggest that users would like to see a wider range of resources, or perhaps even a wider subject coverage.



Data table Q. 15f (64 respondents):

2	3
3	20
4	30
5	11

Q.15f How satisfied are you with the overall ease of use of AERADE?

31% of respondents rated their satisfaction level with the overall ease of use of AERADE at point 3 of the scale, 47% at point 4 and 17% at point 5. 5% rated it at point 2. 95% of respondents rated the ease of use of AERADE at point 3 or above on a scale of 1-5. This indicates that AERADE is very easy to use and presents practically no problems for the user in terms of navigation or usage and would suggest that there is no need for an overhaul or major modification of the existing structure of the Web site.

Q. 16 Do you have any comments concerning aspects of: interface design, usefulness of resource descriptions, searching facility, browsing facility, range of resources, overall ease of use of AERADE?

'I find it difficult to search'

'I got what I needed'

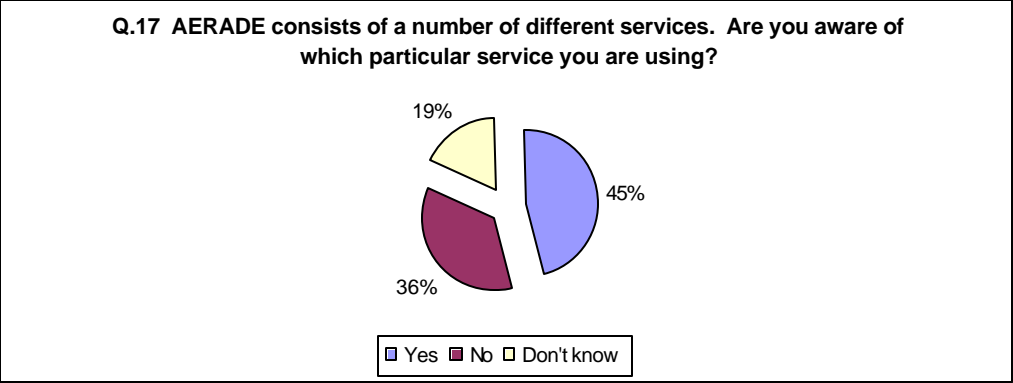
'AERADE is good, but room for improvements'

'It is an excellent service, and I have found many things relating to the airline industry which I don't think I would have found otherwise'

'Very well laid out. Self explanatory'

'I've only used AERADE once, but in 30 seconds I found the most relevant and important documents in weeks of searching. Thank you!'

The free text answers to this question differ widely from finding it difficult to search to being an excellent service on which a user has found items they were sure they could not find elsewhere. These responses, more than a reflection on the service, could reflect the users' familiarity and skill in using Subject Gateways; however, the fact that concerns were voiced here in the difficulty of the search facility should be addressed, perhaps by offering more instruction to the user in the search facility, and by offering alternatives when a search fails to produce results.

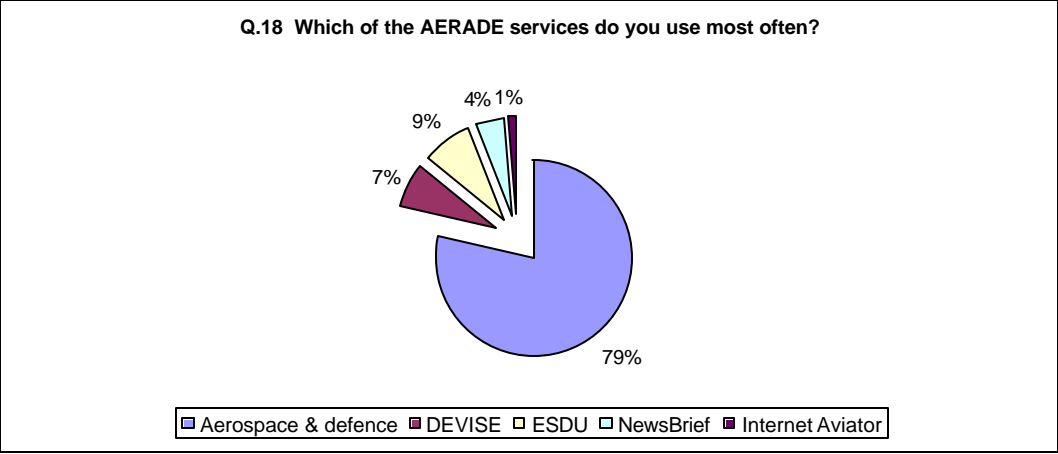


Data table Q. 17 (81 respondents):

Yes	37
No	29
Don't know	15

Q.17 AERADE consists of a number of different services. Are you aware of which particular service you are using?

While 45% of respondents stated that they were aware of which services they were using, 36% said they were not and 19% said that they did not know. The majority of users, then, are not aware of which particular service provided by AERADE they are using. If this is an important aspect of the AERADE Subject Gateway then steps need to be taken to make the user more aware of which service they are accessing, perhaps by giving each a very distinctive and different look.

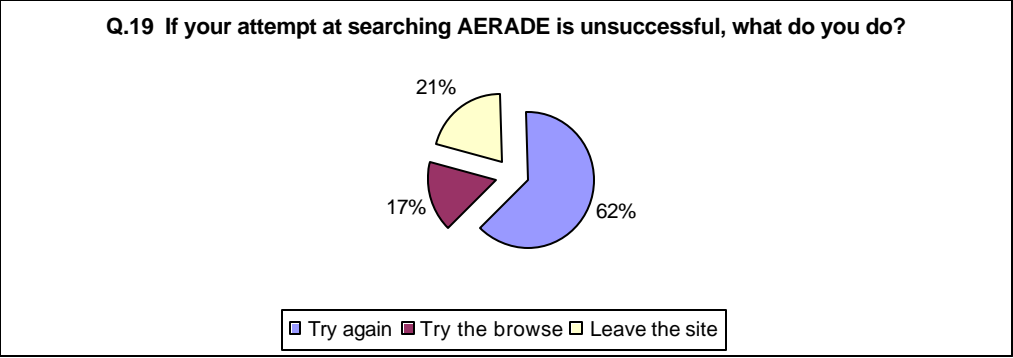


Data table Q. 18 (70 respondents):

Aerospace & defence	55
DEWISE	5
ESDU	6
NewsBrief	3
Internet Aviator	1

Q.18 Which of the AERADE services do you use most often?

The aerospace and defence service came way ahead in the repondents' usage with 79%, ESDU follows behind with 9%. All of the other services were rated in the responses, but to a much lower degree. This would seem to indicate that there is a market out there for the other services, but they perhaps need to be expanded, or publicised to a greater extent, both on and off the AERADE Web site.



Data table Q. 19 (76 respondents):

Try again	47
Try the browse	13
Leave the site	16

Q.19 *If your attempt at searching AERADE is unsuccessful, what do you do?*

67% of respondents stated that they would try again, 17% would try the browse facility and 21% stated that they would leave the site. 84% would be interested enough in the AERADE site and what it could offer to try a different search strategy. To try to lower the numbers of people who might leave the site after their first unsuccessful attempt at finding information, more ideas for searching could be given. If a search is unsuccessful perhaps alternatives could be offered, or the user could be redirected to the browse facility and encouraged to try a different method of searching.

Q. 20 *Are there any other services which you would like to see offered by AERADE?*

'Contacts database'

'Contacts database for MOD/Defence industry'

'Jobs'

'Online journals'

'Conference announcements'

'Only extend resources if this does not diminish content at the moment, e.g. speed, size of print, ease of searching.'

'Full papers contents besides usual abstracts found in other sources, preferably at a reasonable price for downloads'

'It would be useful to have an 'ask the expert' facility, or a technical librarian's news/discussion forum where I could converse with other librarians about mutual matters.'

'Newsletter'

'Freeware'

'More on-line documentation'

There are many useful suggestions in these free text replies, such as an 'ask the expert' service; a newsletter; freeware; contacts database and jobs. These could be areas where the service could look to expand. Some of the suggestions would entail a great deal of cost, for example online journals and again, 'more on-line documentation.' Frequently journal database subscriptions can cost many thousands of pounds and to offer such a service would be untenable on a Subject Gateway, unless the cost was passed onto the user. The problem is knowing whether the volume of users who are prepared to pay for such a service would justify supplying it.

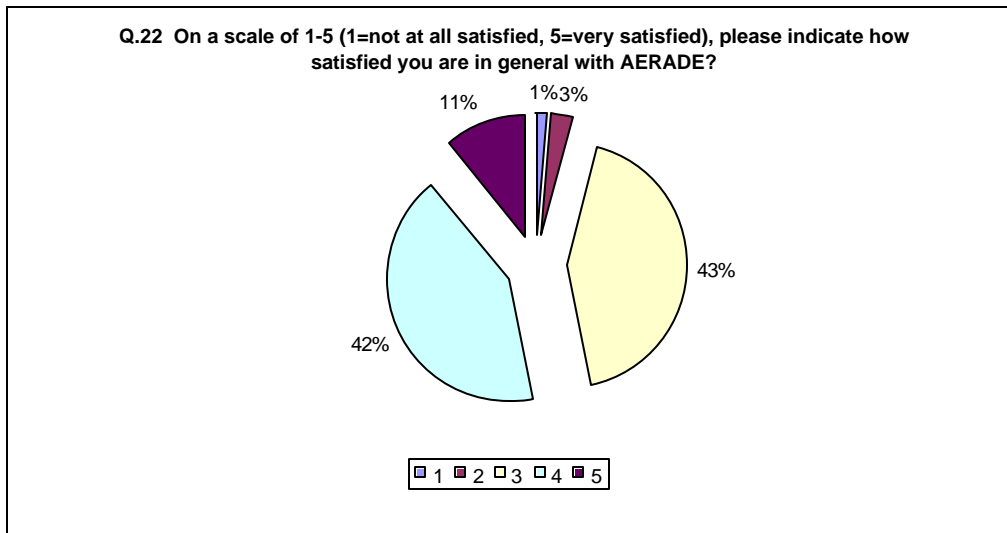
Q. 21 *Are there any other aerospace/defence topics that you would like to see*

AERADE cover?

- 'Economics'
- 'Use of information technology in defence technology'
- 'Military history'
- 'AGARD collections'
- 'Not just industrial, but also technological'
- 'Market information'
- 'Applications of sensing systems'
- 'Information about the supersonic flight design'
- 'Greater access/depth on manufacturing aspects'
- 'Sustainable aviation'

Again there are useful suggestions here for expansion of the service such as military

history and market information.



Data table Q. 22 (73 respondents):

1	1
2	2
3	31
4	31
5	8

Q.22 On a scale of 1-5 (1=not at all, 5=very) how satisfied are you in general with AERADE?

43% of respondents indicated that their general level of satisfaction with AERADE was at point 3 of the scale, 42% at point 4 and 11% at point 5. Only 4% rated it at point 2 or below. 96% of users rated their general satisfaction level with AERADE at point 3 or above on a scale of 1-5. Using Pearson's correlation coefficient on questions 6 (Internet literacy) and 22 results in -0.16 which demonstrates that there is no relationship between Internet literacy and the levels of satisfaction with AERADE, therefore it can be suggested that AERADE is easy to use, whatever level of Internet literacy the user might possess.

Q. 23 *Do you have any other comments/suggestions concerning AERADE?*

'You should really try to get online journals'

'Keep up the good work'

'ESDU is the most useful database'

'I am most impressed, as is my client...'

This final question was put in as a catch-all for any user who felt they had something to say which was not covered by the previous questions. Unfortunately it was used only by a small number of respondents, two praising the service, one with a positive comment on ESDU, and one with a plea for online journals. While these comments may not be very useful in themselves, the question did provide the opportunity for users to expand further on any particular thoughts and was, therefore, a valid question.

6. Recommendations for AERADE

- A consideration of the wide user base of AERADE illustrated by the results from question 1 may be needed to explore the possibility of expanding in new directions to cater for a wider audience than perhaps was anticipated.
- Considering the world wide usage of AERADE it may be necessary to incorporate translation services on the Web site.
- It may be beneficial to publicise to a higher degree on the Web site itself the fact that AERADE is a quality controlled subject gateway to enable users to differentiate it from general Search Engines and thus to understand the important difference between the two.
- A clearer indication of the contents of the AERADE database may help users to avoid searching for information that is outside its scope.
- If users are trying to find information other than purely aerospace and defence on AERADE then perhaps an expansion into different but related areas would widen the market appeal.
- Publicity should be ongoing and constant. Hyperlinked logos could be provided to for all sites listed in the AERADE database.
- Users would like to see a wider range of resources in the database.
Suggestions by users include contacts database, online journals, conference

announcements, newsletters, freeware and full-text documents. There seems to be an awareness and a readiness to pay for full-text for a 'reasonable price' and perhaps this is something that could be explored in order to generate income to sustain the service.

- There is confusion concerning which service users are accessing. A large majority of them are unaware of the different services. Attempts could be made to, for example, make the varying services look different in order to help users identify the different services.
- Attempts could be made to encourage users not to leave the site if their initial search is unsuccessful.

7. Conclusions

- It is clear from the literature, from the survey responses and from the Subject Gateway evaluation that Subject Gateways have an important role in today's vast information environment. They are of most use to academics, researchers and people operating in a particular field, but they could also be useful to the wider community when specific subject information is needed. It has been argued in the literature that information professionals are the ideal candidates to create and to maintain these services, and comparisons made in Chapter 4 between Gateways managed by such professionals and Internet directories which are managed by non-professionals would seem to justify this argument.
- From the literature, the concerns of the AERADE team and the comparison of Subject Gateways in the evaluation it is clear that they need to develop, expand and to take into consideration the responses of their users in order to counteract the threat of unsustainability. Sponsorship and/or advertising is a possible direction for funding, as in the example of the EEVL Gateway. To become an important tool for professionals Subject Gateways need to target their specific marketplace and offer extra services that might make the Gateway essential to its users.
- The survey undertaken of the user base of AERADE has highlighted strengths and weaknesses of the service, and has provided some ideas for further expansion, and therefore may have contributed towards its future sustainability.

8. Reflections

8.1 Reflections on the aims of the project

Whilst the fact that this has been a work-based dissertation has to a large extent been helpful in pre-determining the aims and concerns of the project, thus largely removing any problems of focus, it also dominated the majority of the research. Undertaken again it might be more beneficial to concentrate on the Subject Gateway environment as a whole, and perhaps to have a wider survey which investigated the use of Gateways in general. However, a wider approach was attempted through a consideration of five RDN Gateways, and while it could be argued that the results of this research were subjective, it did produce a useful snapshot of the quality and content of these Gateways. It also produced a useful contrast to Internet directories, making the difference in their quality-control obvious, thus strengthening the importance of hand-picked, quality-controlled Subject Gateways in the market place.

8.2 Reflections on the methodology

Results for the returns of the paper survey were disappointingly low. If the project were to be run again account would have to be taken for the timing of the survey, trying to avoid a time when students are under pressure with assignments or exams. To counteract a low response perhaps another form of data collection could also be employed, such as semi-structured interviews with a user population, thus ensuring a reasonable response from which to draw conclusions. The survey approach may also have been more effective in the Subject Gateway evaluation, but constraints on time meant this was not feasible.

8.3 Reflections on the results

The results on the whole were very positive for the AERADE team and service. This, together with the positive results of the Subject Gateway evaluation will provide material that can be seen as useful in the Subject Gateway environment as a whole. The project, therefore, can be said to have been successful in that it fulfilled the stated aim of critically evaluating AERADE, analysing its strengths and weaknesses and finding areas of possible expansion and improvement and in considering Subject Gateways in the wider context. Further and even wider research into this area is no doubt needed for the information profession to fully appreciate the role and value of Subject Gateways in today's information environment.

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Appendix A

AERADE Evaluation Survey

In this section you will be asked general questions about you and your information seeking strategies.

1. Please indicate your primary role:

Student (further education)

Student (undergraduate)

Student (postgraduate)

Researcher

Lecturer

Engineer

Scientist

Manager

Other (please specify)

2. Where are you primarily based?

UK

Other (please specify).....

3. In which sector are you employed/studying:

Further education

Higher education

Government

Industry

Other (please specify)

4. How often do you use the Internet?

- Every day
- Several times per week
- Several times per month
- Once a month or less
- Never

5. If you use the Internet, do you use it mainly for:

- Work/study related purposes
- Recreational purposes
- Other (please specify)

6. On a scale of 1-5 please indicate how 'Internet literate' you feel you are:

(1 = not at all Internet literate, 5 = very Internet literate)

7. How often do you use the paper resources of a library?

- Every day
- Several times per week
- Several times per month
- Once a month or less
- Never

8. Would you prefer to use the Internet to find information rather than using paper resources?

- Yes
- No
- No preference
-

Don't know

9. When searching the Internet do you use Web Portals or Subject Gateways (other than AERADE)?

Yes

No

Don't know

10. If 'Yes' please specify the one you use most often:

.....

11. If 'Yes' on a scale of 1-5 please specify how successful in finding the information you were seeking through that Web Portal/Gateway has been: (1 = not at all successful, 5 = very successful)

In this section you will be asked questions specific to AERADE, the Web Portal for Aerospace and Defence. If you have not used this facility you have finished the questionnaire. Please place in the envelope provided and return to RMCS. Thank you for your cooperation in completing this survey.

12. How often do you find useful information on AERADE?

Every day

Several times per week

Several times per month

Once a month or less

Never

13. Do you use AERADE mainly for:

Aerospace

Defence

Both

Other

14. Please indicate how you became aware of AERADE:

Publicity material

Internet search

Link from other site

Review

Personal recommendation

Other (please specify)

15. Please indicate your opinion on the following aspects of AERADE using a scale of 1-5 (1 = not at all satisfied, 5 = very satisfied):

Interface design

Usefulness of resource descriptions

Searching facility

Browsing facility

Range of resources

Overall ease of use

16. Do you have any comments concerning any of the preceding aspects?

.....
.....
.....
.....

17. AERADE consists of a number of different services. When you use AERADE are you aware of which particular service you are using?

Yes

No

Don't know

18. Which of the following AERADE services do you use most often:

Aerospace and defence resources

DEVISE

ESDU

NewsBrief

Internet Aviator

19. If your attempt at searching AERADE is unsuccessful, what do you do?

Try again using alternative keywords

Try the 'browse' facility

Leave the site

Other (please specify)

.....
.....

20. Are there any other services which you would like to see offered by AERADE (e.g. discussion forums, jobs, forthcoming events/conference announcements, contacts database, etc.)?

.....
.....

21. Are there any other aerospace/defence topics that you would like to see AERADE cover?

.....

.....
22. On a scale of 1-5 please indicate how satisfied you are in general with the AERADE Web Portal (1 = not at all satisfied, 5 = very satisfied)

23. Do you have any other comments/suggestions concerning AERADE?

.....
.....
.....
.....

This is the end of the questionnaire. Please place in the envelope provided and return to RMCS.

Thank you for your cooperation.

Appendix B

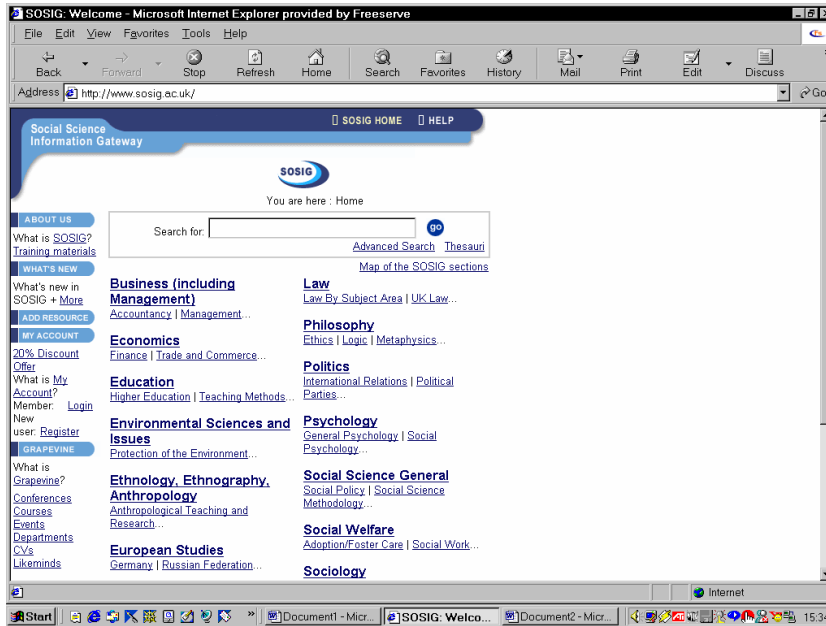


Fig. 2 SOSIG home page



Fig. 3 Biz/ed homepage

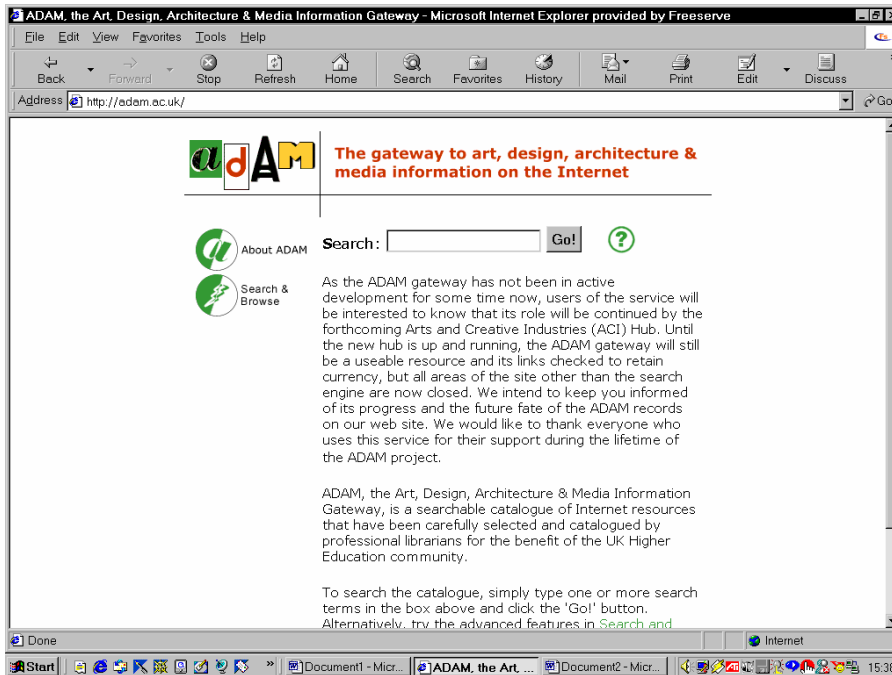


Fig. 4 ADAM homepage

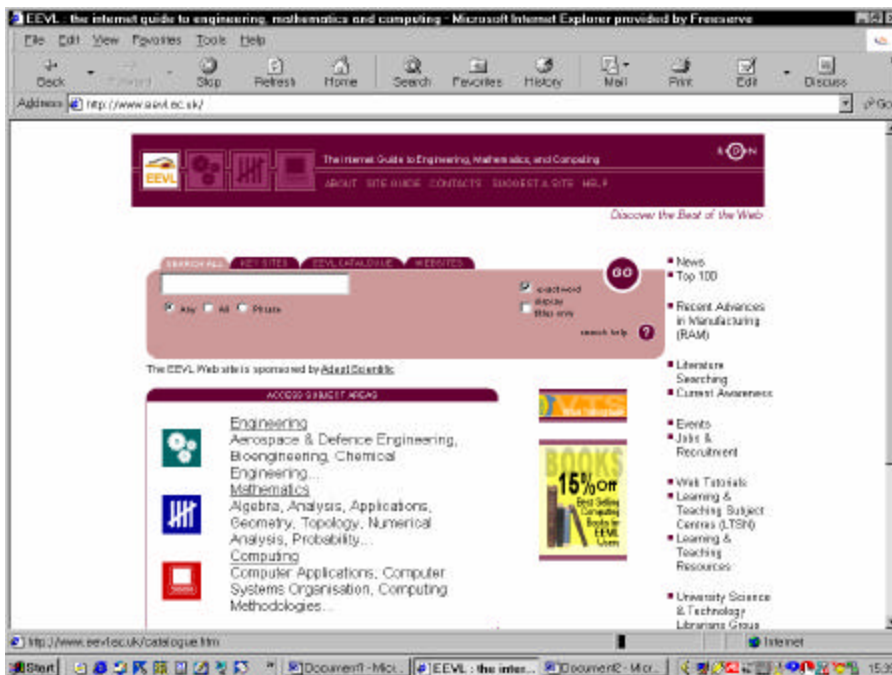


Fig. 5 EEVL homepage



Fig. 6 OMNI homepage

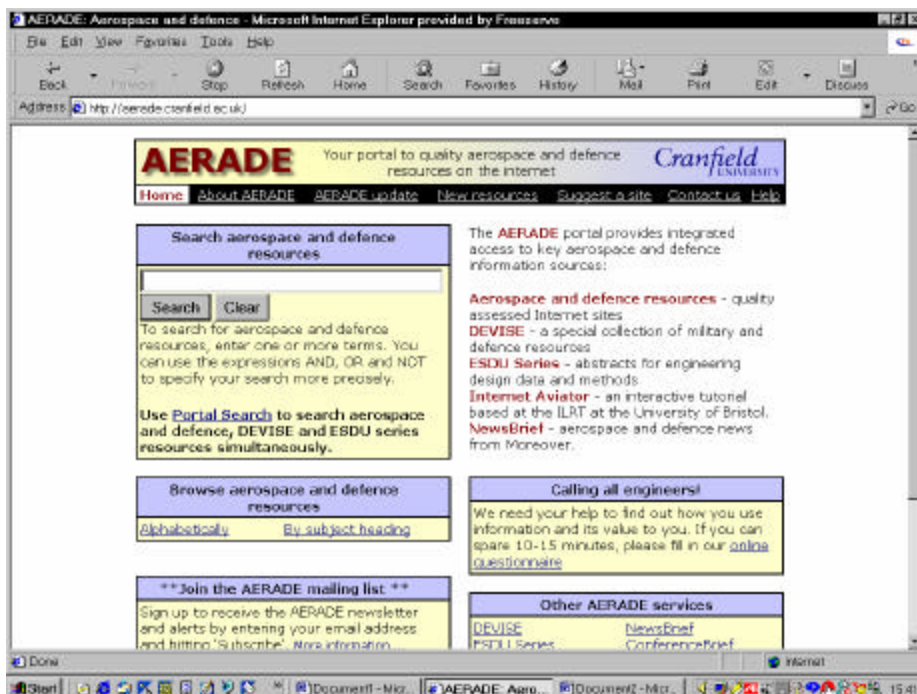


Fig. 7 AERADE homepage