

The Higher Education Funding Councils

**Joint Information Systems
Committee (JISC) - Advisory
Committee on Networking (ACN)
Review of Network Infrastructure Services**

KPMG

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1 Management Summary

KPMG have been commissioned by the Joint Information Systems Committee (JISC) of the Higher Education Funding Councils to review a number of services that are provided to the Higher Education (HE) community via the Joint Academic Network (JANET).

This review has been carried out for the Advisory Committee on Networking (ACN), which is a sub-committee of the JISC. The Terms of Reference of the ACN focus on the delivery of a pervasive, cost-effective network infrastructure, through the medium of JANET and SuperJANET, supported by the following services:

- Mailbase, which is provided from Newcastle University;
- Higher Education National Software Archive (HENSA) / Micros, which is provided from Lancaster University;
- HENSA Unix, which is provided from the University of Kent;
- National Information Systems and Services (NISS), which is provided from the Universities of Bath and Southampton.

As the ACN has recently taken responsibility for these services, it is timely to review their nature and scope, and to assess the extent to which they are cost-effective and contribute to the strategic objectives of the JISC.

The BUBL Information Service, which is provided by Strathclyde University and is the responsibility of the Committee on Electronic Information (CEI), has also been included in this review.

Each of these services is currently funded by the JISC which is, in turn, funded by top-slicing the annual allocations of exchequer funding for Higher Education in England, Scotland, Wales and Northern Ireland.

The review has been managed within the JISC by Peter Ford, Chairman of the ACN and Ron Rogerson, Secretary to the sub-committee.

Objectives of the review

The objectives of the review were to:

- describe the functionality provided to the UK HE sector by the five network services;
- report on the extent to which the services support and carry forward the JISC Strategy, and to make recommendations for any appropriate changes;
- assess the efficiency, effectiveness and value for money which is obtained by the current arrangements for providing the services, in particular by comparison with other existing or possible methods of provision, whether through JISC funding or otherwise, and to make recommendations for any appropriate changes;
- subject to the above, recommend the most appropriate way for the JISC to manage the services.

Strategic context for the review

The JISC strategy re-affirmed the strategic objectives of the Committee, amongst which the following have particular relevance to this review:

- to ensure the provision of a pervasive network infrastructure to the higher education and Research Councils community;
- to ensure the provision of (other) IS software and information services where economic or strategic benefits can be gained;
- to encourage and facilitate the cost-effective, efficient and economical exploitation of all JISC funded initiatives;
- to seek, where possible, alternative sources of funding and partnerships in support of JISC funded initiatives.

In view of the increasingly tight financial constraints within which the HE sector operates, it is important that JISC reviews periodically the value for money that accrues to the HE community as a result of providing these services. Consequently, the strategic justification for this review is that in seeking to provide a pervasive network infrastructure, the JISC must periodically assess whether:

- the provision of the services results in economic or strategic benefits to the sector;
- the HE community uses and exploits the services to maximum effect;
- other means of funding and / or providing the services will deliver a higher cost / benefit ratio than the current approach.

Service review

In order to form judgements about the future funding and provision of the services, it is first necessary to understand them, both individually and comparatively. A review of the services has been undertaken, in two parts:

- an overview of each service, in terms of:
 - nature, history and scope;
 - content / functions;
 - usage;
 - JISC funded expenditure and unit costs;
 - estimated future expenditure;
 - users' perspectives
- a comparison of the services, in terms of their common and distinct characteristics.

The review process has encompassed:

- visiting each of the host University sites, to gather data and views from the staff engaged in providing the services;
- collecting and analysing expenditure and usage data, to produce a three-year analysis of unit costs;
- carrying out an Internet-based questionnaire survey, to ascertain service users' perspectives on the services.

Future funding and service provision

The views expressed by the users of the services demonstrate that the services are highly valued by the UK Higher Education and Research communities. The volume of usage made of the services, and the resultant unit costs indicate that the HE sector achieves value for money in respect of its funding of the services.

However, the JISC and, indirectly, the UK Higher Education and Research communities, is faced with a dilemma. Although the services can be shown to give value for money, and are very popular with users in the community, the legitimate demands for investment in new initiatives and technologies, will always exceed the available resources. The JISC has, therefore, to review priorities and “continuously review the desirability of retaining central funding as technologies become mature or services become commodity services” (paragraph 154).

To this end, a number of options for funding and / or providing the services in the future have been evaluated, these being:

- no change;
- cease funding the services;
- repatriated top-sliced funds and voluntary subscriptions from HEIs;
- per-transaction charging;
- sponsorship;
- merge appropriate services and re-provide them at one or more host UK HEIs;
- market test the services, in appropriate groupings;
- divest the services, in appropriate groupings.

Conclusions

Relationship of the services with the JISC sub-committees

Our study has not been of the JISC, nor of its internal organisation, except insofar as this might relate to the future management of the services under review. However, because they go to the core of the approach which the JISC is taking to discharging its remit through the strategy, we believe that some generalised remarks are relevant.

The JISC strategy says much about the need to work towards universal (within the UK HE sector) access to a comprehensive and co-ordinated collection of electronic information but does not address the tactical approaches to achieving this strategic goal. A manifestation of this weakness is the absence of strategic planning (and consequent direction) in respect of the services we have reviewed.

The present management arrangements at JISC level for directing and monitoring the services appear to be weak. There seems to be no mechanism for setting objectives and development targets for the services and Service Agreements have not been agreed, despite drafts of these having been produced by the services themselves.

The Five Year Strategy heralded the transfer of sub-committee responsibility for Mailbase, the HENSAs and NISS from the (then) ISSC to the ACN, on the premise that the primary purpose of these services is network optimisation and that their direction cannot be un-bundled from the network service itself. However, whilst recognising that

any information service made available on the network will have two purposes - information access and network optimisation, we perceived that, with the exception of Mailbase, the primary purpose ("what they aim to do") of the services reviewed is to consolidate information in a number of areas in order to facilitate access to it. The techniques employed ("how they do it"), especially mirroring, contribute to the secondary objective (for the services) of network optimisation.

Consequently, we have a view that, subject to the future arrangements for the provision of the services the ACN should release management of HENSA/micros, HENSA/Unix and NISS to CEI, retaining only Mailbase.

A management strategy for production services

The JISC Five Year Strategy implies that the future activities of the Committee should be focused on:

- securing optimum use of the network infrastructure, within the funds available;
- supporting (funding) development projects which contribute to the achievement of strategic objectives.

With regard to the services we have reviewed, the Five Year Strategy states that:

"The emphasis will continue to be one of securing the maximum value for money from these services" (paragraph 79)

"The JISC will continuously review the desirability of retaining central funding as technologies become mature or services become commodity purchase" (paragraph 154)

If the JISC is to give effect to these intentions it will need a "management / exit strategy" approach for mature technologies and production services which, in our view, should encompass:

- defining and agreeing robust service agreements, which will form the basis for performance monitoring;
- securing complementary external funding through arrangements such as sponsorship and (where appropriate) advertising;
- undertaking periodic value for money reviews, incorporating unit cost analyses, user surveys and assessments of the contribution made to the JISC strategic objectives;
- merging complementary services to achieve economies of scale / synergy benefits, coupled with co-ordinated development and based on robust service agreements, which can be monitored in performance terms;
- market testing services and (potentially) outsourcing to commercial providers;
- divesting services to commercial providers;
- ceasing to fund technologies / services which have come to the end of their usefulness to the HE community and / or the funding of which can no longer be justified, in relation to other investment priorities.

These steps can be viewed as a continuum, along which services will progress. Not all services (either individually or in groupings) will be suitable for market testing or divestment, and will, therefore, need to be monitored with reference to robust service agreements to ensure their continued usefulness to the sector.

To enable the JISC sub-committees to exercise greater scrutiny of the performance and development of the services, without adding unduly to what are already crowded meeting agendas, an annual programme of reviews should be scheduled into the cycle of sub-committee meetings, so that at any one meeting of a sub-committee the agenda incorporates a review report of at least one service for which it is responsible.

Future funding and service provision

Of the funding options examined it can be concluded that the no change, cessation of funding and repatriation options are not feasible.

Charging for services may be practical in the medium term, although the introduction of such mechanisms will be dependent on commercial research currently being carried out into the issues.

Sponsorship is feasible, as demonstrated to a limited extent by NISS (and to a much greater extent by Imperial College), but a substantial effort would be required to secure sponsorships of sufficient value to enable the JISC to reduce its funding. However, as a means of funding one or more of the services while maintaining the current mode of provision, this appears the most practical option for further consideration.

Each of the service provision options offers the potential to reduce the costs, and consequent funding requirements, of the services evaluated:

- merger and re-provision of services, in appropriate groupings, to host HEIs offers the potential for economies of scale and synergy benefits to be achieved, although it must be acknowledged that even when grouped, the services will still require significant funding from the JISC. However, re-provision should deliver significant savings and in combination with increased sponsorship, should, at the very least, contain the rise in costs;
- market testing offers the potential for reducing costs or, at the very least, containing costs in relation to a specified level of service. It may, however, have the effect of increasing costs as service specifications are costed and currently "hidden" costs are revealed. Moreover, depending on the nature of the service provided (and on the legal status of the eventual provider(s) and the remuneration arrangements agreed) a liability for VAT could arise, thus increasing the cost of the service to the sector;
- divestment offers the potential for significant reduction in the JISC funding commitment, as the future funding of the divested service(s) would be the concern of the commercial provider. The success of this option is, however, dependent on commercial service providers perceiving sufficient hidden value in one or more of the services to warrant a commitment to fund its future operation and development.

In practice, however, no one option can be applied to all services, given their diversity, and a range of approaches will apply.

Recommendations

Management / Exit strategies

A review programme should be undertaken, covering all production services, across all the JISC sub-committees, to define and agree a management / exit strategy for each service. Once defined, these strategies will form the basis for the ongoing management

and review of services for which funding is maintained. Management / exit strategies should be developed for all services / projects that the JISC decides to fund in the future.

Future funding and service provision

The following steps should be taken in respect of the services we have reviewed:

- a market scan should be undertaken, through the medium of one or more PIN notices placed in the OJEC, to assess the scale of interest amongst commercial providers in taking on the provision of the services. Subject to this, a decision can be taken as to the potential for successfully divesting one or more of the services;
- in the event that the market scan reveals insufficient interest from commercial providers, feasibility studies (encompassing an evaluation of costs, benefits, risks and essential steps) should be undertaken into the potential for the following mergers:
 - HENSA Micros and HENSA Unix with SunSite Northern Europe;
 - BUBL and NISS.
- Subject to the outcome of the feasibility studies, the merger of these services should be carried out.

In our view, Mailbase will require different action in the event that a commercial provider does not come forward. Given that Mailbase:

- most closely matches the definition of an infrastructure support service, with relation to the network infrastructure;
- its user base almost wholly within the HE sector;
- offers the potential for large-scale benefits to be achieved by the HE community, in terms of information sharing and collaborative working (both within and between HEIs), along the lines articulated in the Dearing report.

The future development of Mailbase should, therefore, be focused on:

- maximising the use of discussion lists, through marketing and awareness campaigns;
- optimising the cost of providing the service, by adopting leading-edge developments and enabling users to be more self-sufficient.

2 Introduction and Background

2.1 Introduction

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- the provision of the services results in economic or strategic benefits to the sector;
- the HE community uses and exploits the services to maximum effect;
- other means of funding and / or providing the services will deliver a higher cost / benefit ratio than the current approach.

2.4 Report structure

Section 2 documents a structured analysis of the five services, both individually and comparatively;

Section 3 documents an evaluation of options for the future funding of the services and of other approaches to their provision;

Section 4 sets out the conclusions of the review and makes recommendations for action.

2.5 Acknowledgements

KPMG would like to record its thanks for the co-operation, hospitality, and openness of the staff at the individual services who have assisted us in the review. We would also like to express our thanks to Terry Hewitt, Director of the Manchester Visualisation Centre, University of Manchester for his invaluable help with the user survey.

We also wish to place on record our observation that the host HE institutions at which the services are based all provide co-operative regimes and excellent facilities for the services to operate.

3 Service Review

3.1 Introduction

In order to form judgements about the future funding and provision of the services, it is first necessary to understand them, both individually and comparatively. This section documents our review of the services, in two parts:

- an overview of each service, in terms of:
 - nature, history and scope;
 - content / functions;
 - usage;
 - JISC funded expenditure and unit costs;
 - estimated future expenditure;
 - users' perspectives
- a comparison of the services, in terms of their common and distinct characteristics.

The review process has encompassed:

- visiting each of the host University sites, to gather data and views from the staff engaged in providing the services;
- collecting and analysing expenditure and usage data, to produce a three-year analysis of unit costs;
- carrying out an Internet-based questionnaire survey, to ascertain service users' perspectives on the services.

The following points should be noted with regard to the expenditure, usage and unit costs data shown in the analysis of each service:

- historical expenditure data has been provided by the individual services, and represents agreed funding for each year with the JISC. In some instances, neither the JISC nor the individual services have been able to provide sufficient dis-aggregation of the figures, so the resultant unit costs have been calculated on totals only.
- historical usage data has also been provided by the individual services. In most instances, the data has been annualised to the academic year (August / July), although in others the annualisation is either to April / March or to January / December.

3.2 Mailbase

3.2.1 *Service overview*

Mailbase is an electronic mail discussion list service for the United Kingdom academic community. The mission statement of the service is:

“The national Mailbase Service aims to support collaborative work amongst geographically distributed groups of researchers and associated support staff from within the UK higher education and research community. It does this by providing facilities for enhanced mailing lists and for information-sharing. Mailbase is freely available to such groups as a value-added networked service across JANET.”

The service operates from the offices of the University Computing Service at Newcastle University. The hardware / software configuration comprises a number of Sun Sparcstations running under Unix and a number of PC-based mail managers. The service was first established in 1989 and has since expanded greatly to the present time. An outline of the services which constitute Mailbase is shown in the following table.

<i>Service</i>	<i>Description</i>
Electronic Mailing List Service	Mailing list management and support and mail distribution service for over 1,700 mailing lists with more than 117,000 members. Full mail archives are stored for a minimum of one year.
Interactive Service	Access to the Mailbase database, mail archive and documentation for browsing purposes on the WWW
Mailbase Helpline	Expert support for list owners, moderators and members accessible by email, fax and telephone
“How to” information	information on the use of electronic mailing lists - including other list servers, ‘netiquette’, establishing on-line communities, etc.
Links to other services	(1) The Directory of Scholarly Electronic Conferences (a world-wide catalogue of education mailing lists) (2) The Netskills web site; (3) The NISS web site; (4) The BUBL web site; (5) The HENSA Unix & Micros web sites; (6) The MIDAS web site; (7) The SOSIG web site; (8) The JUGA web site.

3.2.2 *Content / Functions*

The service exemplifies the “electronic community” concept, in that it manages electronic mailing lists which are used to facilitate wide-scale communication among groups of academic, research and administrative staff with common interests, who contribute

information to list members, by means of e:mail messages. The lists are managed actively, with message archiving routines being run monthly.

A range of indexes has been developed to assist users in locating lists. The "Lists by Category" page on the Mailbase web site shows 1187 lists categorised by subject areas, as shown in the following table. The 500 or so other lists are "closed", that is, not openly accessible to the .ac user community.

<i>List Category</i>	<i>Number of Lists</i>
Computing & Software Support	138
Support of Teaching & research	115
Economics & Social Sciences	98
Maths & Computing	84
Library	72
Biosciences	65
Physical Sciences	54
Business & Administrative Studies	53
Subjects Allied to Medicine	53
HE Administration	50
Education	47
Engineering & Technology	46
Humanities	46
Languages, Linguistics & Literature	42
Politics, Law & Other Social Sciences	42
Multi-disciplinary	40
Creative Arts & Design	34
Medicine & Dentistry	29
Other University Services	26
Librarianship & Information Science	23
Architecture, Building & Planning	16
Veterinary & Agricultural Sciences	9
Other Technologies	3
Miscellaneous	2
Total Categorised Lists	1187

3.2.3 Usage

The budget proposal for the period 1997 - 2000 states that Mailbase "is the UK's major electronic mailing list for the Higher Education and Research community". The service currently has approximately 117,000 users and over 1,700 active mailing lists. The service is used by CHEST, UCISA and its sub-groups, CTI, TLTP and ITTI, as well as by project groups in the Electronic Libraries programme. The service also supports many subject-based groups, including UK Librarians, University Administrators, Medical Researchers and Social Scientists. The following table summarises the mailing list usage in the period April 1994 - March 1997 (3 years)

<i>Period</i>	<i>Commands</i>	<i>Messages</i>	<i>Web-Site Accesses</i>
---------------	-----------------	-----------------	------------------------------

<i>April 1994 - March 1995</i>	<i>149,820</i>	<i>98,562</i>	<i>n/a</i>
<i>April 1995 - March 1996</i>	<i>260,711</i>	<i>144,856</i>	<i>n/a</i>
<i>April 1996 - March 1997</i>	<i>311,728</i>	<i>199,904</i>	<i>2,019,927</i>

The complexity of the Mailbase service is indicated by these statistics. Commands, messages and web-site accesses are defined below:

- **Commands** - these are instructions sent by service users to the Mailbase server. They enable a user to exercise control over his / her use of the service, without the need to rely on the support infrastructure. Thirteen commands are available for users including “find lists”, “join (listname)”, “leave (listname / all)”, “suspend mail (listname / all)”, “resume mail (listname / all)”;
- **Messages** - these are e:mail messages sent to lists by users. It is important to note that a message sent to a discussion list will be relayed to all members on that list. The total number of messages “administered” by Mailbase is, therefore, a function of the number of messages initiated by users and the number of list members;
- **Web-site accesses** - the Mailbase web-site information on using the service and is, therefore, primarily of use to users of the service, although it is accessible to anyone using the Internet. The number of accesses as an indicator of service usage should, therefore, be used with caution.

3.2.4 JISC Funded Expenditure and Unit Costs

The following table analyses JISC funded expenditure and costs per “member-initiated message” in the period 1993/94 to 1996/97.

	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>
EXPENDITURE	£	£	£
<i>Staff</i>	<i>191,900</i>	<i>174,400</i>	<i>187,900</i>
<i>Non-Staff</i>	<i>24,600</i>	<i>24,200</i>	<i>37,800</i>
<i>Equipment</i>	<i>40,800</i>	<i>15,000</i>	<i>52,000</i>
TOTALS	257,300	213,600	277,700
<i>Messages (April / March)</i>	<i>98,562</i>	<i>144,586</i>	<i>199,904</i>
UNIT COSTS	£	£	£
<i>Staff</i>	<i>1.95</i>	<i>1.21</i>	<i>0.94</i>
<i>Non-Staff</i>	<i>0.25</i>	<i>0.17</i>	<i>0.19</i>
<i>Equipment</i>	<i>0.41</i>	<i>1.10</i>	<i>0.26</i>
TOTALS	2.61	1.48	1.39

The following points should be noted in relation to the unit costs:

- JISC funded expenditure in each year covers the academic year (August to July);
- we have used “member-initiated messages” as the prime measure of activity, although a number of caveats must be entered against the resultant unit costs, including:
 - the technical infrastructure and staffing arrangements for the service do not enable the costs to be further analysed in terms of commands, messages and the web-site service;
 - the service is more meaningfully analysed as a whole, with the commands and web-site features as “added-value” to the principal service of maintaining discussion lists and distributing e:mail messages;
 - the unit costs shown above do not reflect the true cost of distributing messages, although it has not been possible to calculate this as data on the total number of distributed messages is not collected. To find a closer approximation, the above unit costs should be further sub-divided, by at least a factor of ten, which may be a conservative adjustment, given that many lists have 100 or more members.

3.2.5 *Estimated future expenditure*

Funded expenditure is that for which annual Grant is received from JISC. Income is negligible at less than £100 per annum, for supplying multiple copies of documentation to users.

The following table itemises the estimated funded expenditure for 1997/98, based on the initial submissions made in 1996.

Cost Type	£	£
Staff: Directors / Managers (1.2 WTE)	48,112	
ALC Grades (5 WTE)	113,228	
Secretarial Support (1 WTE)	16,466	
General Support (Note 1)	10,800	188,606
Non-Staff: Travel & Subsistence	6,700	
Hardware	12,500	
Maintenance	15,100	
Software	3,800	
Telephone, Postage, Stationery	2,300	
Printing & Publicity, Books etc	5,250	
Recruitment	1,000	
Course & Conferences	4,750	51,400
Capital: Upgrades to hardware		25,000
Estimated Funded Expenditure 1997/98		265,006

Note 1: This sum reflects a token apportionment of the budgeted costs of the Newcastle University Computing Service, which provides technical, personnel, administrative and clerical staff support to Mailbase.

Staff expenditure is approximately 70% of the total. A total of 7.2 whole-time equivalent (WTE) staff are engaged in providing the service, their roles being:

- service direction & management - 1.2 WTE;
- user support & training - 1 WTE;
- helpline & secretarial - 1 WTE;
- documentation & helpline development - 1 WTE;
- “postmaster”, programming & system administration - 1 WTE;
- “webmaster”, programming & database administration - 1 WTE;
- system support & programming - 1 WTE.

3.2.6 User perception

In order to gain an understanding of the perspectives of Mailbase service users, an Internet-based questionnaire survey was carried out in July 1997. A total of 2,826 responses were received, of which 90% were from the UK Higher Education community. The content of the questionnaire and an analysis of the responses received are shown in Appendix 1. The following summary statistics have been drawn from the analysis:

- 2,246 (80%) of respondents are members of between one and five discussion lists;

- 252 (9%) are list owners (i.e., they manage / co-ordinate one or more discussion lists);
- 2,798 (99%) use the service (often or sometimes) for receiving messages from mailing lists;
- 2,320 (82%) use the service often or sometimes for sending messages to mailing lists and 501 (18%) indicated that they never send messages;
- more than 87% use the service for obtaining information and keeping up to date. 1,412 (50%) indicated that the lists are used for group discussion of research / teaching issues;
- 2,140 (76%) find that the service is either fairly easy or very easy to use for group discussions. 76 (2.6%) find the service difficult to use for this purpose.

Survey respondents were invited to make other comments on the Mailbase service and those received are also shown in Appendix 1. Although caution should be exercised in drawing firm conclusions from these comments (as they are self-selecting, and because for each point made an opposing or contradictory point has also been made), the following signals can be discerned:

- the service is highly valued by its users, some of whom have integrated the use of discussion lists into their working methods;
- users are concerned at the growing incidence of junk mail;
- users are not very aware of the helpline or the Web site.

3.3 HENSA / Micros

3.3.1 *Service overview*

The HENSA micros archive contains a large collection of micro-computer Freeware and Shareware software, which can be accessed and downloaded by staff and students at HE institutions and by any other Internet user (although access to the service is restricted to .ac.uk users during weekday working hours). The service operates from Lancaster University and is provided from a Sun Sparcstation computer running under Unix. The mission statement of the service is:

“HENSA/micros is an archive of Public Domain and Shareware micro-computer software for the most commonly used machines in the Higher Education Sector. While catering for the needs of computer experts, its primary aim is to assist those whose specialisations are in other work areas to locate, evaluate and obtain the tools they require to perform their work.”

An outline of the services which constitute HENSA/Micros is shown in the following table.

Service	Description
Micro-computer software archive	Classified, indexed and abstracted archive of micro-computer software
Micro-computer software mirror site	Mirror of a number of primary source sites

There are about 11,000 software items in the archive which are classified and indexed and, where possible, abstracted.

3.3.2 *Content / Functions*

The term “archive” is, in a sense, a misnomer, as the collection comprises the latest available versions of two types of micro-computer software:

- public domain software (Freeware), which is distributed freely with no licence requirements;
- Shareware, which is distributed freely, but requires a licence and / or payment for ongoing use.

The archive currently holds software for the following micro-computer environments:

- IBM-PC (MS-DOS, MS-Windows and OS/2);
- Windows NT;
- Apple Macintosh;
- Atari ST and Falcon;
- Acorn Archimedes;
- Psion;
- Commodore Amiga.

Users of the service can locate software from the archive by either searching, browsing or by a subject-based approach. A range of software tools can also be accessed, for “unpacking” software downloaded from the archive.

3.3.3 Usage

The following table summarises the service usage from 1994/95 to 1996/97 (August / July).

<i>Period</i>	<i>Accesses</i>	<i>Software Volumes</i>
<i>August 1994 / July 1995</i>	<i>2,635,000</i>	<i>388 gb</i>
<i>August 1995 / July 1996</i>	<i>6,255,000</i>	<i>353 gb</i>
<i>August 1996 / July 1997 (expected)</i>	<i>14,858,000</i>	<i>1,157 gb</i>

It is understood that approximately 70% of accesses are made by UK academic users (.ac.uk)

3.3.4 JISC Funded Expenditure and Unit Costs

The following table analyses JISC funded expenditure and costs per access in the period 1993/94 to 1996/97.

	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>
<i>EXPENDITURE</i>	<i>£</i>	<i>£</i>	<i>£</i>
<i>Staff</i>	<i>71,000</i>	<i>61,100</i>	<i>72,500</i>
<i>Non-Staff</i>	<i>8,000</i>	<i>13,300</i>	<i>14,400</i>
<i>Equipment</i>	<i>0</i>	<i>7,900</i>	<i>6,800</i>
<i>TOTALS</i>	<i>79,000</i>	<i>82,300</i>	<i>93,700</i>
<i>Accesses</i> <i>(August / July)</i>	<i>2,635,000</i>	<i>6,255,000</i>	<i>14,858,000</i>
<i>UNIT COSTS</i>	<i>£</i>	<i>£</i>	<i>£</i>
<i>Staff</i>	<i>0.0269</i>	<i>0.010</i>	<i>0.005</i>
<i>Non-Staff</i>	<i>0.0030</i>	<i>0.002</i>	<i>0.001</i>
<i>Equipment</i>	<i>0</i>	<i>0.001</i>	<i>0.0005</i>
<i>TOTALS</i>	<i>0.0299</i>	<i>0.013</i>	<i>0.0065</i>

The following factors have contributed to the enormous increase in accesses and data shipments and the consequent reduction in unit costs:

- the change of approach from cataloguing software to mirroring other sites, which has had the effect of bringing the archive up-to-date, thus encouraging users back to the service from other sites;
- a major publicity drive carried out through the year.

3.3.5 *Estimated Future Expenditure*

The following table itemises the estimated expenditure for 1997/98, based on the agreed funding proposal.

<i>Cost Type</i>	<i>£</i>	<i>£</i>
<i>Staff: Director & Technical Manager (1.25 WTE)</i>	<i>36,000</i>	
<i>Support Staff - ALC Grades (2 WTE)</i>	<i>50,000</i>	<i>86,000</i>
<i>Non-Staff: Travel & Subsistence</i>	<i>5,750</i>	
<i>Maintenance</i>	<i>5,450</i>	
<i>Telephone, Postage, Stationery</i>	<i>2,750</i>	
<i>Printing & Publicity</i>	<i>600</i>	
<i>Training</i>	<i>4,500</i>	
<i>Course & Conferences</i>	<i>700</i>	<i>19,750</i>
<i>Capital: Upgrades to hardware</i>		<i>17,480</i>
<i>Estimated Funded Expenditure 1997/98</i>		<i>123,230</i>

3.3.6 *User perspective*

In order to gain an understanding of the perspectives of HENSA Micros service users, an Internet-based questionnaire survey was carried out in July 1997. A total of 681 responses were received, of which 89% were from the UK Higher Education community. The content of the questionnaire and an analysis of the responses received are shown in Appendix 2. The following summary statistics have been drawn from the analysis:

- 71 respondents (10.4%) use the service more than twice a week, although only 11(1.6%) use it daily. 181 (26.5%) use the service at least once a week. 256 (37.6%) use the service less than once a week and 156 (23%) use the service less frequently;
- the majority of respondents use the service to locate and retrieve PC-based and / or Apple-based software. As an indication of preference between the PC and Apple environments, 71 respondents (10.4%) never retrieve PC software and 469 (69%) never retrieve Apple software;
- 271 (40%) indicated that they find the service very easy to use, while 293 (43%) find it fairly easy to use. 25 (4%) indicated that they find the service sometimes difficult to use and 7 (1%) find it usually difficult to use.

Survey respondents were invited to make other comments on the HENSA Micros service and those received are also shown in Appendix 2. Although caution should be exercised in drawing firm conclusions from these comments (as they are self-selecting, and because for each point made an opposing or contradictory point has also been made), the following signals can be discerned:

- the service is valued by its users, primarily in respect of content and speed of access / transfer;
- the search facility is sometimes problematic;
- certain sections, such as Atari, are not being maintained.

3.4 HENSA Unix

3.4.1 Service overview

HENSA Unix is a widely-based archive of freely available Unix and numerical computing software and related material. The service is operated from the University of Kent. The mission statement for the service is:

“To make available reliably and effectively both Unix related and general material, including software and documentation, so that as wide an audience as possible may profit from the invested effort. To ensure that users of HENSA Unix make effective use of software, hardware and networking resources. To make available Web pages via the proxy cache as efficiently as possible in order to decrease both users’ waiting time for pages and the load on international links.”

An outline of the services which constitute HENSA Unix is shown in the following table.

Service	Description
Main UK mirror ftp site for Unix: UUNET Statlib Maple Matlab Linux Walnut Creek Netlib	Unix software and general interest Statistical software and data Interactive system for symbolic and algebraic computation Scientific and technical computation and visualization Unix-like operating systems and applications for PCs Unix-like operating systems for PCs and CD-ROM related material Mathematical and statistical software
Primary ftp Parallel computing archive site	The JISC funded archive of the Parallel Computing Group consisting of software, documents, papers and other materials related to parallel and high performance computing, especially transputing and the occam language
Miscellaneous archives	Collection of miscellaneous Unix software, some complete netlib libraries and some VMS software. Also contains the Technical Reports database and material stored for Special Interest Groups
Full text search:	On FAQs, RFCs and literary collections
Database search and document retrieval:	On technical reports
The UK Academic Archie Server:	Enabling users to search anonymous ftp sites world-wide by filename
HTML Validation Service:	A facility for self checking of parsing and syntax of HTML links
Academic Directory of UK Web Pages:	Experimental collection of Web home pages for UK HEIs

3.4.2 *Content / Functions*

The HENSA Unix archive is, primarily, a collection of repositories for Unix-based and other software. This “meta-archive” is organised into a number of component shadowed archives, some of which are local (i.e., stored at HENSA) and others which are located elsewhere, but are mirrored by HENSA. These archives can be accessed, and software / information retrieved by a number of methods, including ftp and WWW. The locally stored archives include:

- the Parallel Computing Archive;
- the Dyslexia Archive;
- the Portable Network Graphics (PNG) Archive;
- Collected Algorithms from Transactions on Mathematical Software.

The mirrored archives are further organised as follows:

- Unix for PCs and other environments;
- Languages and environments;
- Multimedia;
- Numerical and statistical;
- Web-servers, browsers, proxy-caches.

A thematic index of the archive is currently being developed, so that software can be retrieved by reference to its function, rather than by reference to its shadowed archive location.

3.4.3 *Usage*

The following table summarises the service usage in the three year period January 1994 to December 1996

<i>Period</i>	<i>Accesses</i>	<i>Software Volumes</i>
<i>January 1994 / December 1994</i>	<i>2,600,000</i>	<i>148.4 gb</i>
<i>January 1995 / December 1995</i>	<i>4,800,000</i>	<i>298.1 gb</i>
<i>January 1996 / December 1996</i>	<i>7,000,000</i>	<i>590.5 gb</i>

3.4.4 *JISC Funded Expenditure and Unit Costs*

The following table analyses JISC funded expenditure and costs per access in the period 1993/94 to 1996/97.

	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>
<i>EXPENDITURE</i>	<i>£</i>	<i>£</i>	<i>£</i>
<i>Staff & Non-Staff</i>	<i>41,300</i>	<i>51,700</i>	<i>58,900</i>
<i>Equipment</i>	<i>30,000</i>	<i>10,000</i>	<i>10,700</i>
<i>TOTALS</i>	<i>71,300</i>	<i>61,700</i>	<i>69,600</i>
<i>Accesses</i>			
<i>Jan / Dec</i>	<i>2,600,000</i>	<i>4,800,000</i>	<i>7,000,000</i>
<i>UNIT COSTS</i>	<i>£</i>	<i>£</i>	<i>£</i>
<i>Staff & Non-Staff</i>	<i>0.0159</i>	<i>0.0108</i>	<i>0.0084</i>
<i>Equipment</i>	<i>0.0120</i>	<i>0.0020</i>	<i>0.0015</i>
<i>TOTALS</i>	<i>0.0279</i>	<i>0.0128</i>	<i>0.0099</i>

3.4.5 *Estimated Future Expenditure*

The following table itemises the estimated funded expenditure for 1997/98, based on the initial funding proposal submitted in 1996.

<i>Cost Type</i>	<i>£</i>	<i>£</i>
<i>Staff: Director / Manager (1 WTE)</i>	<i>28,502</i>	
<i>Support Staff - ALC Grades (1 WTE)</i>	<i>19,972</i>	
<i>Part-time support (4 man-months)</i>	<i>2,080</i>	<i>50,554</i>
<i>Non-Staff: Travel & Subsistence</i>	<i>900</i>	
<i>Maintenance</i>	<i>4,570</i>	
<i>Networks</i>	<i>4,000</i>	
<i>Telephone, Postage, Stationery</i>	<i>650</i>	
<i>Printing & Publicity</i>	<i>700</i>	
<i>Course & Conferences</i>	<i>300</i>	<i>11,120</i>
<i>Capital: Upgrades to hardware</i>		<i>55,034</i>
<i>Estimated Funded Expenditure 1997/98</i>		<i>116,708</i>

3.4.6 *User perspective*

In order to gain an understanding of the perspectives of HENSA Unix service users, an Internet-based questionnaire survey was carried out in July 1997. A total of 197

responses were received, of which 91% were from the UK Higher Education community. The content of the questionnaire and an analysis of the responses received are shown in Appendix 3. The following summary statistics have been drawn from the analysis:

- 19 respondents (9.6%) use the service more than twice a week, although only 5 (2.5%) use it daily. 43 (21.8%) use the service at least once a week. 73 (37%) use the service less than once a week and 47 (24%) use the service less frequently;
- 184 respondents use the service to locate and retrieve Unix software;
- 67 (34%) indicated that they find the service very easy to use, while 80 (41%) find it fairly easy to use. 7 (4%) indicated that they find the service sometimes difficult to use and 9 (5%) find it usually difficult to use.

Survey respondents were invited to make other comments on the HENSA Unix service and those received are also shown in Appendix 3. Although caution should be exercised in drawing firm conclusions from these comments (as they are self-selecting and because for each point made an opposing or contradictory point has also been made), the following signals can be discerned:

- the service is valued by many users;
- search facilities can be problematic.

3.5 National Information Services & Systems (NISS)

3.5.1 Introduction

NISS is a very widely based collection of information services selected to be authoritative and currently relevant to users in the HE sector. It hosts a number of datasets and provides pointers (acting as a gateway service) to others. The subject areas covered include education information, business news, indexes and directories. The service provides a focus for access to information sources and links users to a wide range of services on the Internet and on other networks. NISS is operated by the Universities of Bath and Southampton and is provided on Sun Sparcstation equipment running under Unix. The mission for the service is:

“NISS will make available to the academic community quality information selected to be authoritative, current and comprehensive through service provision which is economic and effective.”

The service describes itself as one which delivers information by being an:

- Information Provider, obtaining and creating information for its customers and making it available;
- Information Service Provider, mounting information of interest to the community on behalf of the organisations who own it;
- Gateway Service Provider, offering a directory of pointers to information sources.

3.5.2 Content / Functions

An outline of the services which constitute NISS is shown in the following table.

<i>Service</i>	<i>Description</i>
NISS Information Gateway	An index facility with links or pointers to primary sources of information. Main areas are: <ul style="list-style-type: none"> ■ Welcome & Help; ■ News & Current Affairs; ■ Directory of Networked Resources; ■ Works of Reference & Bibliographic Services; ■ Education, Administrative & Professional; ■ IT & Computing; ■ NISS Services & Developments.
NISS Electronic Mail Lists	e:mail lists for broadcasting information about NISS, for a discussion forum on NISS services and for the NISS User Group
NISS Publications	Newsletter and training materials
NISS Services:	

<i>Service</i>	<i>Description</i>
Athens	Authentication system for controlled access subscription services, such as Computergram, EBSCO, MasterFile or NetFirst
Computergram	Daily journal on IT issues - free to all HEIs in UK & Ireland
Business & Industry Service	Business news initiative, newspapers, news service for the academic community. Subscription based.
EBSCO MasterFile Service	On-line access to a large collection of periodicals. Subscription based
NetFirst	Network directory. Free of charge to staff & students in UK HE
NISSWAIS	Searchable information collections
Former NISS Services	Services now superseded, (such as the original NISS Gateway) but maintained for a defined period to enable users to migrate to upgraded services
WWW sites & domains for other bodies	Sixteen sites managed by NISS on behalf of other bodies including CHEST, DFEE, HEFCE, HEFCW, HEQC, JISC and JNUG

The key features of the NISS service are:

- provision and access to selected information;
- detailed descriptions in a resource descriptions database;
- information selected by experts within their subject areas;
- information delivered to the desktop;
- an information (rather than a technology) focus;
- continued support for users applying “old technology”, such as VT100 and X.25.

The focal point of the NISS service is the Information Gateway, which was launched in February 1995, when all of the services provided previously were either consolidated within the Gateway service, or discontinued. Within the Gateway, the Resource Descriptions Database provides an “enabling infrastructure”, of addresses and descriptions of information resources. Most of the resource descriptions are provided by “subject experts”, drawn from academics, subject librarians, learned bodies and professional societies. NISS provides supporting software tools and facilities to support the work of the subject experts, and these contributors are credited for their work on the relevant on-line pages.

3.5.3 Usage

The following table summarises the service usage in the three year period from August 1994 to July 1997

<i>Period</i>	<i>Accesses</i>
<i>August 1994 / July 1995</i>	<i>not available</i>
<i>August 1995 / July 1996</i>	<i>9,998,795</i>
<i>August 1996 / July 1997 (estimated)</i>	<i>9,720,874</i>

3.5.4 JISC Funded Expenditure and Unit Costs

The following table summarises expenditure and cost per access in the three year period August 1994 to July 1997.

	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>
<i>EXPENDITURE</i>	<i>£</i>	<i>£</i>	<i>£</i>
<i>Staff</i>	<i>191,000</i>	<i>274,000</i>	<i>285,000</i>
<i>Non-Staff</i>	<i>85,000</i>	<i>76,600</i>	<i>89,000</i>
<i>Equipment</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
<i>Less: Recharges & Misc Income</i>	<i>(33,000)</i>	<i>(89,000)</i>	<i>(80,000)</i>
<i>TOTALS</i>	<i>243,000</i>	<i>261,600</i>	<i>294,000</i>
<i>Accesses</i>	<i>n/a</i>	<i>9,998,795</i>	<i>9,720,874</i>
<i>(August / July)</i>			
<i>UNIT COSTS</i>	<i>£</i>	<i>£</i>	<i>£</i>
<i>Staff</i>	<i>n/a</i>	<i>0.0274</i>	<i>0.0293</i>
<i>Non-Staff</i>	<i>n/a</i>	<i>0.0076</i>	<i>0.0092</i>
<i>Equipment</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
<i>Less: Recharges & Misc Income</i>	<i>n/a</i>	<i>(0.0089)</i>	<i>(0.0082)</i>
<i>TOTALS</i>	<i>n/a</i>	<i>0.0261</i>	<i>0.0303</i>

3.5.5 Future Estimated Expenditure

The following table itemises the estimated funded expenditure for 1997/98.

<i>Cost Type</i>	<i>£</i>	<i>£</i>
<i>Staff:</i>		<i>296,400</i>
<i>Non-Staff: Travel & Subsistence</i>	<i>15,600</i>	
<i>Maintenance</i>	<i>9,400</i>	
<i>Networks</i>	<i>10,400</i>	
<i>Telephone, Postage, Stationery</i>	<i>18,700</i>	
<i>Printing & Publicity</i>	<i>5,200</i>	
<i>Training</i>	<i>5,200</i>	
<i>Membership Fees</i>	<i>1,000</i>	
<i>Furniture & Equipment</i>	<i>10,400</i>	
<i>Conferences</i>	<i>8,300</i>	
<i>Contingency</i>	<i>8,300</i>	<i>92,500</i>
<i>Gross Expenditure</i>		<i>388,900</i>
<i>Income: Subscriptions</i>	<i>(25,000)</i>	
<i>Advertising</i>	<i>(12,000)</i>	
<i>CHEST Recharge</i>	<i>(65,000)</i>	<i>(102,000)</i>
<i>Estimated Funded Expenditure 1997/98</i>		<i>286,900</i>

3.5.6 *User perspective*

In order to gain an understanding of the perspectives of NISS service users, an Internet-based questionnaire survey was carried out in July 1997. A total of 410 responses were received, of which 94% were from the UK Higher Education community. The content of the questionnaire and an analysis of the responses received are shown in Appendix 4. The following summary statistics have been drawn from the analysis:

- 66 respondents (16%) use the service more than twice a week, and 38 (9%) use it daily. 128 (31%) use the service at least once a week. 94 (23%) use the service less than once a week and 78 (19%) use the service less frequently;
- respondents' usage of the services is varied. Of the Information Gateway component services (excluding NISS services and developments), reference and bibliographic sources are the most used (often and sometimes = 73%) and IT & computing the least used (often and sometimes = 51%). The electronic mail lists are used (often & sometimes) by 24% of respondents and the NISS Publications service by 21%;
- 138 respondents (33%) find the service very easy to use and 158 (38%) find the service fairly easy. 24 (6%) find the service sometimes difficult to use and 11 (2.7%) find the service usually difficult to use.

Survey respondents were invited to make other comments on the NISS service and those received are also shown in Appendix 4. Although caution should be exercised in drawing firm conclusions from these comments (as they are self-selecting and because for each point made an opposing or contradictory point has also been made), the following signals can be discerned:

- the service is highly valued by its users;
- given the scale and comprehensives of the information base, updating and maintenance may sometimes slip, leaving out of date information on the system.

3.6 BUBL Information Service

3.6.1 *Service overview*

Established in 1990, BUBL then stood for Bulletin Board for Libraries. The service originated as part of Project Jupiter (based at Glasgow University) which aimed to train librarians in using JANET. When funding for Project Jupiter ended in 1991, BUBL was taken over and run on a voluntary basis by a group of librarians from the Universities of Strathclyde and Glasgow. The service grew in popularity and gained small sums of sponsorship from commercial organisations. In 1994, the service first received funding for maintenance and development from the JISC. In 1995, BUBL was designated by the JISC as a UK national information service, with funding on a three-yearly cycle.

BUBL is a collection of value-added information services, accessible via the Internet and operated from the Andersonian Library of Strathclyde University. The services are provided on a series of Viglen micro-computers, running under Windows NT. The mission of the service is:

“To provide the UK Higher Education Community with value added access to Internet resources and services of academic, research and professional significance by:

- direct service provision, incorporating subject-based, classified and other organisational routes;
- creating and stimulating the creation of original electronic resources;
- mounting appropriate commercial services;
- providing organised access to other services;
- encouraging and co-ordinating the efforts of information specialists;
- providing associated reference, help, current awareness and training services”

The BUBL service has been completely redesigned and revamped to provide a Web based service following its move from Bath to Strathclyde. Consequently, the KPMG team has not explored the former mode of service, except for usage statistics and from a financial perspective, and has concentrated on the current approach.

As its name suggests, BUBL was originally focused on the needs of librarians. In recognition of the fact that the service is now used by a much broader base of users, the service provider is redefining the service access mechanisms to make them more accessible to non LIS professionals.

The principal service within BUBL is BUBL LINK (Libraries of Networked Knowledge) which provides subject-based catalogued access to Internet resources in each subject area. BUBL does not have the resources to do this directly and relies on a network of contributing subject specialists to moderate its content. An outline of the services which constitute BUBL is shown in the following table.

Service	Description
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BUBL Link	A subject based database of network accessible knowledge allowing complex searches, indexed under LCSH and classified under DDC with Z39.50 access
BUBL Journals	Table of Contents and Abstract service to around 300 journals, mainly LIS but also including agriculture, business, politics and medicine
BUBL News	Information on the content drawn from relevant mailing list activities including job vacancies, forthcoming conferences and workshops, details of current offers and other news items relevant to the academic community
BUBL UK	A new service from March 1997 which is described as an <i>institution tree</i> providing links to numerous well-known and important UK WWW sites including central and local government; universities and colleges; libraries and museums; societies, associations and charities; newspapers and magazines
BUBL Search	Highly developed search engine for looking at the entire BUBL database
BUBL Mail	Maintenance of a number of mailing lists for the library community (as a "list owner" on the Mailbase service)
BUBL Archive	Collection of non-current items which are still considered to have some value
BUBL Admin	Information about BUBL itself including FAQs and help files

3.6.2 Content / Functions

As described in the 1997/98 Application for Funds, The BUBL service claims to provide a "unique" service in three areas:

- a one-stop-shop, covering all subject areas, alphabetically and by UDC, and with limited search facilities;
- an Internet resources current awareness service, covering all subject areas;
- a specialist LIS service.

The LINK service builds on these features to offer:

- a one-stop access to all areas, via WWW and Z39.50, with full cataloguing and indexing of each resource, link checkers and automatic expiry;
- DDC classification and LCSH headings.

3.6.3 Usage

The following table summarises the service usage in the three year period from August 1994 to July 1995 (July 1995 activity has been extrapolated).

<i>Period</i>	<i>Accesses</i>
<i>August 1994 / July 1995</i>	<i>2,194,180</i>
<i>August 1995 / July 1996</i>	<i>2,181,034</i>
<i>August 1996 / July 1997 (estimated)</i>	<i>2,965,554</i>

Of the five services reviewed, BUBL alone publishes a wide range of service usage statistics on its web pages, which cover:

- Gopher usage at the UKOLN site - September 1993 - March 1997;
- WWW usage at the UKOLN site - August 1994 - February 1997;
- BUBL usage summary March - June 1997;
- Accesses to main BUBL services - April - June 1997;
- Top twenty journals on BUBL - April - June 1997;
- BUBL search statistics - June 1997;
- 100 most popular items on BUBL - June 1997;
- BUBL accesses by Country or Domain - April - June 1997;
- Top 100 systems accessing BUBL - April - June 1997.

The publication of these statistics indicates a sense of openness and accountability on the part of the provider team which should be applauded.

3.6.4 *JISC Funded Expenditure and Unit Costs*

The following table summarises expenditure and cost per access in the three year period August 1994 to July 1997.

	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>
<i>EXPENDITURE</i>	<i>£</i>	<i>£</i>	<i>£</i>
<i>Staff & Non-Staff</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
<i>Equipment</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
<i>TOTALS</i>	<i>56,700</i>	<i>46,500</i>	<i>104,700</i>
<i>Accesses</i> <i>(August / July)</i>	<i>2,194,180</i>	<i>2,181,034</i>	<i>2,965,554</i>
<i>UNIT COSTS</i>	<i>£</i>	<i>£</i>	<i>£</i>
<i>Staff & Non-Staff</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
<i>Equipment</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
<i>TOTALS</i>	<i>0.026</i>	<i>0.021</i>	<i>0.035</i>

3.6.5 *Estimated Future Expenditure*

The following table itemises the estimated funded expenditure for 1997/98, based on the initial funding proposal submitted in 1996.

Cost Type	£	£
Staff: Director (0.1 WTE)	4,200	
Co-ordinator - ALC Grade (1 WTE)	35,500	
Information Officer (1 WTE)	21,400	
Administrator (1 WTE)	12,300	
Computing Support (0.5 WTE)	14,400	87,800
Non-Staff: Travel & Subsistence	4,000	
Maintenance	2,500	
Networks	1,000	
Telephone, Postage, Stationery	1,000	
Printing & Publicity	2,500	
Training	1,000	
Course & Conferences	1,000	
Contingency	10,000	23,000
Estimated Funded Expenditure 1997/98		110,800

3.6.6 User perspective

In order to gain an understanding of the perspectives of BUBL service users, an Internet-based questionnaire survey was carried out in July 1997. A total of 186 responses were received, of which 87% were from the UK Higher Education community. The content of the questionnaire and an analysis of the responses received are shown in Appendix 5. The following summary statistics have been drawn from the analysis:

- 33 respondents (18%) use the service more than twice a week, and 10 (5%) use it daily. 52 (27%) use the service at least once a week. 38 (20%) use the service less than once a week and 41 (22%) use the service less frequently;
- respondents' usage of the services is varied. BUBL Journals and BUBL Search are the most used (often and sometimes = 69% and 70%) and BUBL Mail the least used (often and sometimes = 12%);
- 55 respondents (29%) find the service very easy to use and 70 (37%) find the service fairly easy. 11 (6%) find the service sometimes difficult to use and 6 (3%) find the service usually difficult to use.

Survey respondents were invited to make other comments on the BUBL service and those received are also shown in Appendix 5. Although caution should be exercised in drawing firm conclusions from these comments (as they are self-selecting and because for each point made an opposing or contradictory point has also been made), the following signals can be discerned:

- the service is highly valued by its users;

- users perceive that BUBL and NISS may be overlapping;
- as with NISS, given the scale and comprehensives of the information base, updating and maintenance may sometimes slip, leaving out of date information on the system.

3.7 Comparative analysis of the services

3.7.1 Introduction

Having reviewed the services individually, it is also useful to compare them, in terms of:

- content / functions;
- usage;
- co-ordination of the services by the JISC;
- value for money.

3.7.2 Content / functions

3.7.2.1 Mailbase

Mailbase is distinct from the other services in that it exists to provide a medium through which users can communicate, together with value-added features such as list management and a helpdesk. It is an “infrastructure” service, in the sense that it provides an environment in which service users can work.. It is not a unique service, as many other discussion list services exist, both within the HE sector and elsewhere. The extent of its use by the HE community, however, suggests that it is favoured by HE users. It can reasonably be predicted that a more widespread use of discussion lists will develop as this method of communication and work support becomes more acceptable across the HE community, and, consequently, the Mailbase service will assume greater importance as an infrastructure service.

3.7.2.2 HENSA Micros & HENSA Unix

As software archives, the HENSA services share a common purpose, although their “markets” are quite different. HENSA Unix provides a source for Unix software and related information, whereas HENSA Micros is focused on providing a source of Freeware and Shareware software for micro computers. However, both services are concerned with mirroring software sources held elsewhere, cataloguing, indexing and providing efficient search / browse facilities, to provide an effective service to users.

Neither service is unique, as many software archives exist, both within the HE sector and elsewhere. The other widely known archive in the UK HE sector is SunSite Northern Europe, which is hosted by Imperial College, London. The three services are, in effect, “connected”, in that SunSite provides a mirror both to HENSA Micros, for users requiring IBM PC Windows Freeware and Shareware, and to HENSA Unix, for users requiring Unix software. SunSite is not funded by the JISC, as it benefits from extensive sponsorship by computer and communications hardware companies, although the staffing of the service is provided voluntarily by members of the computing departments at Imperial College.

3.7.2.3 BUBL & NISS

As information reference sources, BUBL and NISS are similar in function and, in some respects, content. Whilst both of the service teams acknowledge the similarity, they differ in their perspective on this:

- the BUBL provider team have expressed a view that the availability of NetFirst (provided by NISS) from June 1996, and the increasing trend toward library cataloguing of electronic resources via OPACS, may have an effect on the popularity and usage of the BUBL service. The BUBL provider team recognise that there is a need to monitor the development of both services, and for each to adjust its service provision accordingly, in order to minimise wasted JISC funding on overlapping and / or duplicated services;
- as part of its published description of the Resource Descriptions Database (<http://www.niss.ac.uk/niss/rdd.html>), the NISS provider team has made a statement of its perceived positioning in relation to the BUBL service. The following points are made:
 - NISS has always aimed to provide information resources for the end-user i.e., a user with limited knowledge of the information sources available in a particular field. Before the introduction of the resource description, the end-user has often relied on skilled intermediaries, such as librarians and information officers;
 - the BUBL service “is one of length, offering access to a large number of sources, but to those skilled enough to make judgements on the basis of professional experience”. In contrast, the NISS service “is one of strength, which offers a selected set of well-described sources from which an inexperienced user may make a selection with confidence”. “It is the resource descriptions, their database, and the associated infrastructure that distinguish the NISS service from the BUBL service”;
 - NISS and BUBL complement one another. The services have “consciously, and by mutual agreement, developed systems which are complementary”.
 - “In January 1994, NISS and BUBL agreed to standardise on UDC as the subject classification methodology, and to share a common method of managing the work of resource discovery”. The shared method “comprises a shared “well” (or depository) for information sources identified by volunteers within the community, consisting of the URL, the name of the resource and its UDC”. This (address set) is mounted on the BUBL system “without further input”. The BUBL approach is, therefore, “to provide a very large number of information resources quickly, and in an organised fashion, but without selection or description”;
 - In contrast to the BUBL approach, the NISS method is “to take only selected records from the well, add full resource descriptions and include them in the database. This selection, and the provision of resource descriptions, is normally done by subject experts, and is aimed at providing information that is likely to be of real value to staff and students in the course of their teaching, learning and research”. The NISS approach is “selective and provides a quality resource description, plus the infrastructure to support and sustain on-going growth in the user and information bases”;

- “NISS and BUBL meet two different user requirements, and use some common standards and methods, in order to eliminate confusion for users and reduce duplication of effort”.

3.7.3 *Usage*

3.7.3.1 *Mailbase*

Mailbase is almost exclusively used by the UK academic community and the number of messages circulated indicates that the service is valued by its subscribers, although the available usage statistics, which represent member-initiated messages, significantly understates the total number, as a single initiated message will be circulated to all members of a list.

The user survey revealed anecdotal evidence of an increase in unsolicited junk mail, which indicates that commercial organisations that use mailing lists as a marketing medium are gaining access. This is regrettable, as junk mail can have an insidious effect on the credibility of discussion lists and the regard in which the service is held by its users. As indicated earlier, with effective management and marketing the use of Mailbase should increase significantly in the future, although this growth will be influenced by the image and reputation of the service, as perceived by existing and potential users. It is, therefore, important that the service continues to develop and present itself as efficient, customer-friendly and, relative to other like services, free of junk mail.

3.7.3.2 *HENSA Micros & HENSA Unix*

The HENSA services attract vast levels of usage, this being an indication of the demand for comprehensive sources of Unix and PC Freeware / Shareware. Both services are widely used via the Internet by other than the UK academic community. Whilst such usage is, in effect, subsidised by JISC, it is difficult to prevent while the services remain Internet-based and free at the point of access.

3.7.3.3 *BUBL & NISS*

Both BUBL and NISS are used extensively by other than the UK academic community. An indication of the extent of this can be gleaned from reviewing the usage of the BUBL service, as shown in the following tables. The analyses of usage by country / domain and of the top 100 systems is very informative, as summarised in the following tables.

BUBL Accesses by Country or Domain - April / June 1997

<i>Country / Domain</i>	<i>April 1997</i>		<i>May 1997</i>		<i>June 1997</i>	
	<i>Accesses</i>	<i>%</i>	<i>Accesses</i>	<i>%</i>	<i>Accesses</i>	<i>%</i>
<i>UK</i>	<i>139,902</i>	<i>38</i>	<i>168,046</i>	<i>32</i>	<i>159,501</i>	<i>38</i>
<i>Unresolved Numerical Addresses</i>	<i>50,895</i>	<i>14</i>	<i>83,781</i>	<i>16</i>	<i>56,412</i>	<i>14</i>
<i>Commercial, mainly USA</i>	<i>45,927</i>	<i>12.5</i>	<i>72,504</i>	<i>14</i>	<i>68,633</i>	<i>17</i>
<i>America On-line</i>	<i>21,877</i>	<i>6</i>	<i>30,931</i>	<i>6</i>	<i>8,361</i>	<i>2</i>
<i>Other</i>	<i>109,643</i>	<i>29.5</i>	<i>177,955</i>	<i>32</i>	<i>121,676</i>	<i>29</i>
<i>Totals</i>	<i>368,244</i>		<i>533,217</i>		<i>414,583</i>	

It should be noted that the access statistics for the periods shown above are understated, by approximately 25%, as they do not include data for individual accesses to the BUBL-Link database. This omission has occurred as a result of a software fault and is being rectified. The correct activity statistics will then be published on the web-site.

Top 100 Systems Using BUBL - April / June 1997

<i>System / Source</i>	<i>April 1997</i>		<i>May 1997</i>		<i>June 1997</i>	
	<i>Accesses</i>	<i>% of Total Accesses</i>	<i>Accesses</i>	<i>% of Total Accesses</i>	<i>Accesses</i>	<i>% of Total Accesses</i>
<i>.ac.uk</i>	<i>35,254</i>	<i>10</i>	<i>48,177</i>	<i>9</i>	<i>50,045</i>	<i>12</i>
<i>.proxy.aol.com</i>	<i>16,116</i>	<i>4</i>	<i>21,484</i>	<i>4</i>	<i>1,018</i>	<i>0.3</i>
<i>firestone archive.org</i>	<i>5,702</i>	<i>1.5</i>	<i>6,715</i>	<i>1.25</i>	<i>3,764</i>	<i>0.9</i>
<i>nsl.lymehouse .com</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>30,283</i>	<i>7.3</i>
<i>Other</i>	<i>5,770</i>	<i>1.5</i>	<i>13,507</i>	<i>2.75</i>	<i>27,843</i>	<i>6.7</i>
<i>Totals</i>	<i>62,842</i>	<i>17</i>	<i>89,883</i>	<i>17</i>	<i>112,953</i>	<i>27.2</i>

Taken together, these tables show that the BUBL service is accessed extensively by other than UK HE users. Commercial use is high, particularly from the United States. It is also worth noting that:

- in the second table, the .proxy.aol.com address indicates large-scale caching of the BUBL information by commercial organisations. Accesses from this source fell significantly in June;
- over 30,000 accesses (7.3% of the total) in June were made from the ns1.lymehouse.com URL, which is thought to be an agent address.

This evidence of extensive use of BUBL by other sources than .ac.uk indicates that the service is known of, and valued, on a world-wide scale. Although we have no information as to the extent to which NISS is used in this way, it is reasonable to assume that this is the case. Use of the services on this scale may mean that there is potential for securing funding through advertising and /or sponsorship.

3.7.4 *Co-ordination of the services by the JISC*

JISC support for the five services is variable. For example:

- some have been given the security of three-year rolling contracts, while others are funded on a year-on-year basis;
- some have been granted capital funds, while others have relied more on host institutions and / or sponsorship from computer hardware and software companies.

In all cases, JISC support is centred upon funding individual staff posts, which is a commonplace practice for project funding in the HE sector. Consequently, it can be argued that the services are, in funding terms, projects, as a formal relationship between service purchaser and service provider, documented in a Service Agreement (SA) does not exist.

SAs have been produced in draft form by each of the services, although these have not yet been endorsed by the JISC, which initially requested their drafting. A brief review of the draft SAs indicates that they are not well drafted, nor are their contents entirely appropriate. It can be inferred that the lack of rigour in defining, agreeing and monitoring the development and operation of the services, via the medium of robust SAs may be a contributory factor to the overlap in the content and function of some of the services.

The services all have Steering Committees whose role is to guide developments, examine budget submissions, and act as a formal link to the JISC and feedback user opinion.

3.7.5 *Value for money*

An assessment of the value for money delivered by the services can be made from the following perspectives:

- costs per unit of output (unit costs);
- user perception;
- contribution to the JISC strategic objectives.

3.7.5.1 Unit costs

The following table summarises the unit costs for the services for 1995/96, the latest full year for which data is available.

Unit Costs 1995/96	Mailbase £	HENSA Micros £	HENSA Unix £	NISS £	BUBL £
Staff	1.21	0.010	0.0108	0.0274	Note 2
Non-Staff	0.17	0.002	Note 1	0.0076	“”
Equipment	1.10	0.001	0.0020	n/a	“”
(Income)	n/a	n/a	n/a	(0.0089)	n/a
TOTALS	1.48	0.013	0.0128	0.0261	0.021

Notes:

1. The 1995/96 expenditure data provided for HENSA Unix is not dis-aggregated into staff and non-staff elements;
2. The 1995/96 expenditure data provided for BUBL is not dis-aggregated into staff, non-staff and equipment elements.

As indicated earlier, the Mailbase unit costs are overstated as we have, in the absence of more detailed information, used annual totals of “initiated messages”. It can reasonably be assumed that a more accurate measure of unit cost would be at least one-tenth of the above.

The unit costs for the HENSA services are almost identical and, given the volume of use made of the services make for a very low-cost service.

Other than the similarity between the total unit costs for NISS and BUBL, it is not reasonable to draw any further inferences, due to the lack of expenditure data for BUBL.

From a unit cost perspective, and based on the available information, it can reasonably be concluded that the services deliver value for money.

3.7.5.2 User perception

The evidence of the user surveys shows that all of the services are, in general, very highly regarded by their users. From the user perspective, based on the results of the surveys, it can reasonably be concluded that the services deliver value for money.

3.7.5.3 Contribution to the JISC strategy

The JISC strategy itself positions the services as being “core” production services (paragraph 56). They are described as being amongst “a range of network services to help connected institutions make full use of their network connection”.

Paragraph 79 of the strategy sets out the intention to transfer responsibility for these services to the ACN “to reflect their role as underpinning network services”. In the same paragraph the services are said to be “mature, well-proven and valuable services that enjoy widespread support across the whole community”. The strategic intention of the JISC in relation to these services is “to be one of securing the maximum value for money from these services”. An assessment of the value for money contributed by each service is shown below.

■ Mailbase

It can reasonably be concluded that Mailbase is (in general) very highly valued by its users, many of whom have come to rely on the use of discussion lists as a core working practice in supporting research and teaching. It can also be concluded that the Mailbase facilities could be used more widely and extensively by the UK HE community as the use of electronic mail and discussion lists becomes pervasive, although research may be required into the cultural and training implications at the institutional level of such developments in working practices.

The contribution of Mailbase to the JISC strategic objectives is best considered in terms of the “economic or strategic benefits” that are gained by the HE sector as a result of the use of discussion lists. In view of the fact that those who use the service in this way claim that it is invaluable, and that this method of working is, as yet, not widespread, it can be said that greater access to and use of the service could deliver substantial benefits to the HE community in the future, particularly in the light of the recommendations made by Dearing and by the Joint DfEE / HE Sector Working Group on Information Technology in Higher Education.

It is recognised that the unit costs derived above overstate the cost of processing messages, but further work is required to identify the total number of messages circulated before more accurate unit costs can be produced.

■ HENSA Micros and HENSA Unix

It is reasonable to conclude that both the HENSA services are highly valued by their users and that use of the services has increased dramatically in the past two years, to the point where the unit cost of providing them is negligible.

The key issue concerns the overall contribution that the services make to the JISC strategic objectives. Given that the both services mirror other archives, many of which are hosted in the USA, it can be said that this, in effect, reduces the demand for international bandwidth use, thus releasing existing capacity for other uses. Consequently, it can be said that in providing the archive services in this way, the HENSAs make a valuable contribution to the JISC objective of “ensuring the provision of a pervasive network infrastructure”.

However, the HE sector bears an annual cost of approximately £210,000 in maintaining comprehensive archives for so many platforms and there are many other archives in existence, although it is acknowledged that these are often restricted to a single hardware and / or operating system platform. However, the inter-relationship between the HENSA services and the SunSite service at Imperial College highlights the potential for further collaboration.

■ NISS and BUBL

It is reasonable to conclude that both NISS and BUBL are highly regarded by their users and that they provide a valued service. With regard to the contribution made to the JISC

strategic objectives, Both NISS and BUBL should be evaluated for the extent to which their provision results in economic and / strategic benefits to the UK HE sector, particularly in terms of providing users with structured, edited and rapid access to a wide range of information sources and, consequently, helping to minimise the increase in demand for national and international bandwidth.

4 The Future - Funding and Service Provision

4.1 Introduction

There are a number of perspectives on the cost and (by inference) the future funding of the network services:

- from the individual user's perspective, the services are free and are, therefore of benefit;
- from the provider perspective, the greater the number of users, the lower the unit costs;
- from the perspective of an individual HEI, there is the opportunity cost of not receiving its share of the monies that are top-sliced to fund the services (approximately £5,000 per annum). Against this must be set the value that the HEI gains from the services being available for students, lecturers, researchers and administrative and computing staff to use;

However, from the JISC perspective, the funds required for these services represent approximately 2.5% of available funds (for 1997/98). Although this appears a small proportion of the total budget, the cost of providing the network infrastructure and the demands for JISC to fund other projects continue to be made, and the total budget is now decreasing, in real terms, as the resources allocated to the HE sector in annual public spending rounds continue to decrease.

For their part, the services continue to require additional funds, to cover increased costs arising from inflation, to finance expansion and to enable development work to be carried out.

The views expressed by the users of the services demonstrate that the services are highly valued by the UK Higher Education and Research communities. The volume of usage made of the services, and the resultant unit costs indicate that the HE sector achieves value for money in respect of its funding of the services.

However, the JISC and, indirectly, the UK Higher Education and Research communities, is faced with a dilemma. Although the services can be shown to give value for money, and are very popular with users in the community, the legitimate demands for investment in new initiatives and technologies, will always exceed the available resources. The JISC has, therefore, to review priorities and "continuously review the desirability of retaining central funding as technologies become mature or services become commodity services" (paragraph 154).

In this section, a number of options for the future funding and provision of the services are examined.

4.2 Funding options for consideration

The following funding options (which would entail no change in the present mode of service provision) have been considered:

- no change;

- cease funding the services;
- repatriated top-sliced funds and voluntary subscriptions from HEIs;
- per-transaction charging;
- sponsorship.

These options are explored further in the following sub-sections.

4.2.1 *No change*

This option represents the status quo. JISC would continue to fund the services in the present way. The services would continue to be provided from the present host sites. The advantages, disadvantages and necessary actions for this option are set out in the following table.

<i>Advantages</i>	<i>Disadvantages</i>	<i>Actions Needed</i>
No disruption to current services	<p>Does not address the requirement on the JISC to continually review the funding and provision of mature (production) services;</p> <p>Does not address the JISC requirement to release available funds;</p> <p>Does not address the services' need for additional funding for expansion & development.</p>	<p>At a minimum, the relationship between the services and the JISC should be placed on a business-like footing, through the medium of robust service agreements;</p> <p>The issue of overlap between some of the services, and with other JISC funded services / projects should be investigated.</p>

Although by taking the above actions an improvement in the effectiveness of the services and in the working relationships with JISC would result, the status quo is not viewed as a feasible option, given the importance to the JISC of releasing currently committed funds and to the services of gaining additional funds for expansion and development.

4.2.2 *Cease funding the services*

The JISC is under no obligation to fund the services indefinitely, but only for the term of the extant funding agreement. It follows that funding could be ended by giving notice that it will not be renewed at the end of the current term. The advantages, disadvantages and actions needed to implement this option are set out in the following table.

<i>Advantages</i>	<i>Disadvantages</i>	<i>Actions Needed</i>
The JISC can be certain that significant funds will become available for re-application after the current funding agreements end.	Although the users of services would, inevitably, find a substitute source on the Internet, the loss of services, such as Mailbase, which are focused on the HE community, would be of some concern. Such action would affect the image of the JISC in the HE community and would generate widespread uncertainty amongst the other services currently funded.	Decide which services will no longer merit funding at the end of the current term. Serve notice on those services that funding will not be renewed. In practice, an exit / closure strategy will have to be produced by the host HEI. The JISC may feel obligated to participate in this process; Communications and public relations would require careful management.

Although feasible in theory, this option does not seem practicable, certainly for the services that are the subject of this review. Notwithstanding this, it is possible to see a combination of circumstances arising in which the cessation of funding is the only option although, in this eventuality, the JISC would be obliged to ensure an exit / closure strategy.

4.2.3 *Repatriated top-sliced funds and voluntary subscriptions from HEIs*

This option would mean ending the current top-slicing approach to funding and apportioning the current total of funds for the services across the UK HEIs, which would then be able to decide whether to subscribe for using the services. The services would continue to be provided from the present host sites. The advantages, disadvantages and necessary actions for this option are set out in the following table.

<i>Advantages</i>	<i>Disadvantages</i>	<i>Actions Needed</i>
<p>The services will be able to bid to the HEIs for additional funding for expansion / development;</p> <p>Offers HEIs the option of subscribing to the services they value.</p>	<p>The JISC is unable to re-apply the funds that are re-patriated;</p> <p>Increased administration for the services;</p> <p>Unless the funds are ring-fenced at HEI level, it is possible that the overall level of funds available will reduce;</p> <p>The services will face increased uncertainty as to the level of funding that will be attracted each year;</p> <p>Services which fail to attract sufficient funding would decline.</p>	<p>An equitable method of apportioning the currently top-sliced funds among HEIs would be required;</p> <p>Specifications should be drawn up for the services. These would be built into service level agreements and issued to all participating HEIs;</p> <p>Administrative processes for fund transfers would be developed;</p> <p>The services would draw up funding bids for each year and submit these to the subscribing HEIs.</p> <p>The services would need to be marketed more assertively than at present;</p> <p>The approach should be applied to all other current "production" services managed by the CEI and other sub-committees.</p>

The re-patriation of top-sliced funds to HEIs may reduce the total amount of funding available, as some would be consumed in overheads and some would not be made available by the HEIs for the purpose for which it was re-patriated. There is a risk, therefore, that voluntary subscriptions would be made from a reduced total pool of funds. This approach would generate uncertainty within and among the services as they seek to balance their expected costs and the consequent subscription level against the number of institutions which they expect to participate. Furthermore, there would be the danger that users in those institutions which had opted out would impose higher, but hidden, costs on JANET as they accessed the same information from original sources.

Although this option has the attraction of giving choice to the HEIs, and potentially increased funding for the services, this marginal benefit is far outweighed by the dangers of reduced funding and, critically, the fact that the JISC is unable to re-apply the re-patriated funds for other projects.

4.2.4 *Per-transaction charging*

This option entails the introduction of charging mechanisms to enable the collection of income on a per-transaction basis. The services would continue to be provided from the present host sites. The advantages, disadvantages and necessary actions for this option are set out in the following table.

<i>Advantages</i>	<i>Disadvantages</i>	<i>Actions Needed</i>
<p>Potentially greater income for the services, if a significant number of users can be encouraged to contribute what would be a very low per-unit charge;</p> <p>The JISC would be able to re-apply to other projects the funds that would no longer be required by the services.</p>	<p>Increased administration for the services;</p> <p>Users may be inclined to go to alternative or prime sources elsewhere on the Internet;</p> <p>To the extent that the costs of one or more of the services are not covered by income from charges, the JISC would be required to continue to fund the difference.</p>	<p>The services would have to be costed, to ensure recovery of costs, plus a margin for development, in the charges;</p> <p>Accounting arrangements at the sites would need to be strengthened, as would reporting arrangements to the JISC;</p> <p>The JISC would need to continue to make funding provision to cover the net costs of the services;</p> <p>The services would need to be more assertively marketed than at present;</p> <p>The approach should be applied to all other current "production" services managed by the CEI and other sub-committees.</p>

Although a potentially feasible option in the medium-term, per-transaction charging is not considered feasible at the present time as the administrative overheads would be large, while the individual cost per transaction is small and the ability to discriminate between users, and the purpose for which services are used, is poor.

4.2.5 Sponsorship

<i>Advantages</i>	<i>Disadvantages</i>	<i>Actions Needed</i>
<p>On a sufficiently large scale, sponsorship could reduce funding requirements significantly. The software archive hosted by Imperial College (SunSite Northern Europe) is an example of large-scale sponsorship;</p> <p>The JISC would be able to re-apply to other projects the funds that would no longer be required by the services.</p>	<p>Given the effort required to identify and attract sponsors and, subsequently, sustain relationships with them, the sums involved would need to be significant (relative to current costs);</p> <p>Increased administration for the services;</p> <p>Some of the services are more attractive to large-scale sponsorship than others;</p> <p>In the event that one or more sponsors were to withdraw, the services affected could be faced with curtailing their activities, or even ceasing operations, if either alternative sources of sponsorship could not be found and / or the JISC could not provide "safety net" funding.</p>	<p>A sponsorship campaign would be established. Given the effort involved, this would probably have to be co-ordinated or carried out by the JISC;</p> <p>The JISC would need to continue to make funding provision to cover the net costs of the services;</p> <p>If continuity of service provision is seen as important, contingency funding may need to be provided for by JISC, in the event that significant sponsorship funds were withdrawn from one or more of the services;</p> <p>The approach should be applied to all other current "production" services managed by the CEI and other sub-committees.</p>

Attracting industrial sponsorship has the merit of reducing real costs, although most of the services have pursued such opportunities in the past, with varying success. Moreover, this approach could send the wrong signals to the community about JISC's commitment to its own strategy and the rationale for pursuing sponsorship would need to be communicated. The nature and terms of any sponsorship would need to be in keeping with the objectives and ethos of the service(s) concerned. There is also an issue of continuity i.e., in the event that the sponsorship arrangement ceased, the JISC may not have the funds available to fill the gap, thus placing the viability of the services at risk.

4.3 Service provision options

The following service provision options (which would entail changes to the current mode of service provision) have been considered;

- merge appropriate services and re-provide them at one or more host UK HEIs;
- market test the services, in appropriate groupings;
- divest the services, in appropriate groupings.

These options are explored further in the following paragraphs.

4.3.1 *Merge and re-provide the services at one or more host UK HEIs*

This option would entail the merger, and re-provision, of appropriate groups of services at one or more host HEIs, which may (or may not) include the present hosts. The services which appear to offer scope for merger are:

- HENSA Micros and HENSA Unix (with consideration of closer collaboration, even merger, with the service hosted by Imperial College);
- BUBL and NISS

The JISC would continue to fund the services, via top-sliced funds, possibly supplemented by sponsorship for some or all of the services and, in the medium term, per-transaction charges.

Before pursuing this option, the JISC should evaluate for inclusion in the exercise the other “production” services currently managed by the CEI and other sub-committees.

The advantages, disadvantages and actions needed to implement this option are set out in the following table.

<i>Advantages</i>	<i>Disadvantages</i>	<i>Actions Needed</i>
<p>The services will remain part of the HE community;</p> <p>With careful planning and implementation, the re-provided services could realise economies of scale and synergy benefits (both operationally and technically) that may, in turn, reduce (or at least contain) the cost of the services;</p> <p>The JISC would be able to re-apply to other projects the funds that would no longer be required by the services;</p> <p>HEIs would be able to bid to host one or more of the merged services. Conversely, HEIs that wish to relinquish their current host status would be able to do so;</p> <p>The successful implementation of one or more mergers would demonstrate that the JISC is effective in balancing the ongoing development of services within funding constraints.</p>	<p>Not all of the services lend themselves to merger. These would continue to be funded in the present way, unless another means of service provision can be implemented;</p> <p>The merging and re-provision process would need to be resourced;</p> <p>Existing staff expertise could be lost if services are re-provided at other HEIs;</p> <p>The process could lead to a loss of morale at the current service sites and possible loss of key staff;</p> <p>Service provision may be disrupted;</p> <p>Excludes the potential for Private Sector input and funding.</p>	<p>Consultation on this option would need to be undertaken by the JISC, with the services, their host HEIs and with the wider HEI community;</p> <p>The approach should be applied to all other current “production” services managed by the CEI and other sub-committees;</p> <p>Specifications for the merged services would be developed and HEIs invited to bid to provide them;</p> <p>The relationship between the re-provided services and the JISC should be placed on a business-like footing, through the medium of robust service agreements.</p>

This option offers the potential for reducing costs and consequent funding requirements. However, regardless of how successful the exercise is, the JISC will still be faced with having to fund the services, substantially, although this requirement may be reduced to the extent that the services are successful in attracting sponsorship.

4.3.2 *Market test the services, in appropriate groupings*

This option would mean that the value for money obtained from the services would be tested against the market, i.e., other service providers (both commercial providers and other HEIs) would be invited to bid to operate the services, either at a lower cost than at

present or, for the same (or higher) level of cost, to deliver greater value for money. The service groupings which would appear to lend themselves to this approach are:

- Mailbase;
- HENSA Micros and HENSA Unix;
- BUBL and NISS.

Again, before commencing one or more market testing exercises, the JISC should evaluate for inclusion in the exercise the other “production” services currently managed by the CEI and other sub-committees.

The current host HEIs and / or the existing service provider teams would prepare and submit “in-house” bids to provide the services to a defined specified level of service.

The JISC would continue to fund the services, via top-sliced funds, possibly supplemented by selective per-transaction charges and sponsorship for some or all of the services.

Given the current funding levels, the market testing process would probably be carried out within the provisions of the EU Procurement directives, specifically, in UK legislation, the Public Services Contracts Regulations (PSCR)1993

In the event that the market testing process results in a change of provider, the staff currently engaged in providing the services would transfer to the alternative provider(s), consequently the provisions of the TUPE regulations may apply.

The advantages, disadvantages and actions needed to implement this option are set out in the following table.

<i>Advantages</i>	<i>Disadvantages</i>	<i>Actions Needed</i>
<p>May reduce (or at least contain) the cost of the services;</p> <p>The JISC would be able to re-apply to other projects the funds that would no longer be required by the services;</p> <p>HEIs would be able to bid to host one or more of the merged services. Conversely, HEIs that wish to relinquish their current host status would be able to do so;</p> <p>Offers potential for introduction of “new money” via commercial providers.</p>	<p>There may not be sufficient alternative providers for some of the service groups;</p> <p>The process would highlight the costs that are “hidden” in the current mode of provision. The JISC would incur a higher cost for the services, regardless of whether the in-house teams or another provider wins the market test;</p> <p>The issue of VAT liability would arise. JISC would pay VAT on the provision of any services that are outsourced, as a result of market testing;</p> <p>The TUPE provisions may apply if staff are transferred to a different provider. Whilst not a disadvantage in itself, the cost implications may have an impact on the outcome of the market test;</p> <p>The process would require administration, as a market test would be carried out for each service grouping;</p> <p>Service staff links with academia could be severed in the event that the services are outsourced following a market test;</p> <p>The process could lead to a loss of morale at the current service sites and possible loss of key staff;</p> <p>Service provision may be disrupted.</p>	<p>A market scan would need to be carried out to ascertain the potential number of alternative providers that may be interested in participating in the market testing process. This would be effected by issuing one or more Prior Information Notices (PINs) as specified by the PSCR;</p> <p>Full specifications for the merged services would be developed. These would need to be fully costed in order to establish benchmarks for assessing the value for money offered by bidders;</p> <p>Consultation on this option would need to be undertaken by the JISC, both with the services, their host HEIs and with the wider HEI community;</p> <p>The approach should be applied to all other current “production” services managed by the CEI and other sub-committees.</p>

This option has the potential for realising financial savings, to the extent that either the current providers will reduce their costs to meet the specified service standards. However, the process is as likely to lead to higher costs as:

- the currently “hidden” costs of providing the services may surface;
- VAT will be chargeable on the charges for any services that are outsourced as a result of market testing.

4.3.3 *Divest the services, in appropriate groupings, to commercial service providers*

This option would entail the transfer and funding of the services, in appropriate groupings, to one or more alternative commercial providers. The JISC would no longer fund the services, as this would be for the alternative provider(s) to address, either through subscriptions, per-transaction charging, advertising income, or a combination of these.

The JISC would, at the very least, no longer be required to fund the services. Indeed, it may be the case that a cash inflow (or capital receipt) to JISC would result, based on the value of any fixed assets and / or goodwill acquired by the “buyer”.

Given the current funding levels, the divestment process would probably be carried out within the provisions of the EU Procurement directives, specifically, in UK legislation, the Public Services Contracts Regulations (PSCR)1993

The staff currently engaged in providing the services would transfer to the alternative provider(s), consequently the provisions of the TUPE regulations may apply.

The service groupings which would appear to lend themselves to this approach are as for the previous option. Again, the JISC should evaluate for inclusion in the exercise the other “production” services currently managed by the CEI and other sub-committees.

The advantages, disadvantages and actions needed to implement this option are set out in the following table.

<i>Advantages</i>	<i>Disadvantages</i>	<i>Actions Needed</i>
<p>Unlike re-provision and market testing, this option offers the potential for JISC to cease funding the services completely, thus releasing significant funds for application elsewhere;</p> <p>Current host HEIs would be able to relinquish their status;</p> <p>Offers potential for introduction of “new money” via commercial providers.</p>	<p>It may not be possible to divest some (or any) of the service groups either through insufficient commercial interest, or because the services do not lend themselves commercially-based provision. These services would continue to be funded in the present way, unless another means of service provision can be implemented;</p> <p>The TUPE provisions may apply if staff are transferred to a different provider. Whilst not a disadvantage in itself, the cost implications may have an impact on the outcome of the divestment(s);</p> <p>The divestment processes, one for each service grouping, would require much administration;</p> <p>Service staff links with academia could be severed in the event that the services are divested;</p> <p>The process could lead to a loss of morale at the current service sites and possible loss of key staff, in turn reducing the perceived attractiveness of the affected service(s);</p> <p>Service provision may be disrupted.</p>	<p>A market scan would need to be carried out to ascertain the potential number of alternative providers that may be interested in acquiring the services. This would be effected by issuing one or more Prior Information Notices (PINs) as specified by the PSCR;</p> <p>Prospectuses for the service groups would be developed;</p> <p>The service groups would be subject to a valuation, carried out by professionally competent advisers, to ascertain their value, as a basis for assessing the offers received;</p> <p>Consultation on this option would need to be undertaken by the JISC, both with the services, their host HEIs and with the wider HEI community;</p> <p>The approach should be applied to all other current “production” services managed by the CEI and other sub-committees.</p>

5 Conclusions, Recommendations and Next Steps

5.1 Future funding and service provision

5.1.1 *Conclusions*

5.1.1.1 Relationship of the services with the JISC sub-committees

Our study has not been of the JISC, nor of its internal organisation, except insofar as this might relate to the future management of the services under review. However, because they go to the core of the approach which the JISC is taking to discharging its remit through the strategy, we believe that some generalised remarks are relevant.

The JISC strategy says much about the need to work towards universal (within the UK HE sector) access to a comprehensive and co-ordinated collection of electronic information but does not address the tactical approaches to achieving this strategic goal. A manifestation of this weakness is the absence of strategic planning (and consequent direction) in respect of the services we have reviewed.

The present management arrangements at JISC level for directing and monitoring the services appear to be weak. There seems to be no mechanism for setting objectives and development targets for the services and Service Agreements have not been agreed, despite drafts of these having been produced by the services themselves.

The Five Year Strategy heralded the transfer of sub-committee responsibility for Mailbase, the HENSAs and NISS from the (then) ISSC to the ACN, on the premise that the primary purpose of these services is network optimisation and that their direction cannot be un-bundled from the network service itself. However, whilst recognising that any information service made available on the network will have two purposes - information access and network optimisation, we perceived that, with the exception of Mailbase, the primary purpose ("what they aim to do") of the services reviewed is to consolidate information in a number of areas in order to facilitate access to it. The techniques employed ("how they do it"), especially mirroring, contribute to the secondary objective (for the services) of network optimisation.

Consequently, we have a view that, subject to the future arrangements for the provision of the services the ACN should release management of HENSA/micros, HENSA/Unix and NISS to CEI, retaining only Mailbase. As this issue is not within our terms of reference, we have not presented this as a recommendation, but as a view upon which the sub-committee may wish to reflect.

5.1.1.2 A management strategy for production services

The JISC Five Year Strategy implies that the future activities of the Committee should be focused on:

- securing optimum use of the network infrastructure, within the funds available;
- supporting (funding) development projects which contribute to the achievement of strategic objectives.

With regard to the services we have reviewed, the Five Year Strategy states that:

"The emphasis will continue to be one of securing the maximum value for money from these services" (paragraph 79)

"The JISC will continuously review the desirability of retaining central funding as technologies become mature or services become commodity purchase" (paragraph 154)

If the JISC is to give effect to these intentions it will need a "management / exit strategy" approach for mature technologies and production services which, in our view, should encompass:

- defining and agreeing robust service agreements, which will form the basis for performance monitoring;
- securing complementary external funding through arrangements such as sponsorship and (where appropriate) advertising;
- undertaking periodic value for money reviews, incorporating unit cost analyses, user surveys and assessments of the contribution made to the JISC strategic objectives;
- merging complementary services to achieve economies of scale / synergy benefits, coupled with co-ordinated development and based on robust service agreements, which can be monitored in performance terms;
- market testing services and (potentially) outsourcing to commercial providers;
- divesting services to commercial providers;
- ceasing to fund technologies / services which have come to the end of their usefulness to the HE community and / or the funding of which can no longer be justified, in relation to other investment priorities.

These steps can be viewed as a continuum, along which services will progress. Not all services (either individually or in groupings) will be suitable for market testing or divestment, and will, therefore, need to be monitored with reference to robust service agreements to ensure their continued usefulness to the sector.

To enable the JISC sub-committees to exercise greater scrutiny of the performance and development of the services, without adding unduly to what are already crowded meeting agendas, an annual programme of reviews should be scheduled into the cycle of sub-committee meetings, so that at any one meeting of a sub-committee the agenda incorporates a review report of at least one service for which it is responsible.

5.1.1.3 Future funding and service provision

Of the funding options examined it can be concluded that the no change, cessation of funding and repatriation options are not feasible.

Charging for services may be practical in the medium term, although the introduction of such mechanisms will be dependent on commercial research currently being carried out into the issues.

Sponsorship is feasible, as demonstrated to a limited extent by NISS (and to a much greater extent by Imperial College), but a substantial effort would be required to secure sponsorships of sufficient value to enable the JISC to reduce its funding. However, as a means of funding one or more of the services while maintaining the current mode of provision, this appears the most practical option for further consideration.

Each of the service provision options offers the potential to reduce the costs, and consequent funding requirements, of the services evaluated:

- merger and re-provision of services, in appropriate groupings, to host HEIs offers the potential for economies of scale and synergy benefits to be achieved, although it must be acknowledged that even when grouped, the services will still require significant funding from the JISC. However, re-provision should deliver significant savings and in combination with increased sponsorship, should, at the very least, contain the rise in costs;
- market testing offers the potential for reducing costs or, at the very least, containing costs in relation to a specified level of service. It may, however, have the effect of increasing costs as service specifications are costed and currently “hidden” costs are revealed. Moreover, depending on the nature of the service provided (and on the legal status of the eventual provider(s) and the remuneration arrangements agreed) a liability for VAT could arise, thus increasing the cost of the service to the sector;
- divestment offers the potential for significant reduction in the JISC funding commitment, as the future funding of the divested service(s) would be the concern of the commercial provider. The success of this option is, however, dependent on commercial service providers perceiving sufficient hidden value in one or more of the services to warrant a commitment to fund its future operation and development.

In practice, however, no one option can be applied to all services, given their diversity, and a range of approaches will apply.

5.1.2 *Recommendations*

5.1.2.1 *Management / Exit strategies*

A review programme should be undertaken, covering all production services, across all the JISC sub-committees, to define and agree a management / exit strategy for each service. Once defined, these strategies will form the basis for the ongoing management and review of services for which funding is maintained. Management / exit strategies should be developed for all services / projects that the JISC decides to fund in the future.

5.1.2.2 *Future funding and service provision*

The following steps should be taken in respect of the services we have reviewed:

- a market scan should be undertaken, through the medium of one or more PIN notices placed in the OJEC, to assess the scale of interest amongst commercial providers in taking on the provision of the services. Subject to this, a decision can be taken as to the potential for successfully divesting one or more of the services;
- in the event that the market scan reveals insufficient interest from commercial providers, feasibility studies (encompassing an evaluation of costs, benefits, risks and essential steps) should be undertaken into the potential for the following mergers:
 - HENSA Micros and HENSA Unix with SunSite Northern Europe;
 - BUBL and NISS.
- Subject to the outcome of the feasibility studies, the merger of these services should be carried out.

In our view, Mailbase will require different action in the event that a commercial provider does not come forward. Given that Mailbase:

- most closely matches the definition of an infrastructure support service, with relation to the network infrastructure;
- its user base almost wholly within the HE sector;
- offers the potential for large-scale benefits to be achieved by the HE community, in terms of information sharing and collaborative working (both within and between HEIs), along the lines articulated in the Dearing report.

The future development of Mailbase should, therefore, be focused on:

- maximising the use of discussion lists, through marketing and awareness campaigns;
- optimising the cost of providing the service, by adopting leading-edge developments and enabling users to be more self-sufficient.