

Final Report

from the

**JISC Scholarly Communications
Group (SCG)**

to the

**Research Support Libraries
Group (RSLG)**

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1. Summary of Conclusions and Recommendations

1.1 Introduction

RSLG's vision indicates that the core concern is to ensure that researchers working in the UK can have access to the full range of world-class information resources. This entails a focus on delivery: ensuring that individual researchers have easy access to the information they need wherever this may be located. SCG believes that a step-change in the current scholarly communications system is needed to lead to a future in which:

- scholars produce intellectual output that is first SHARED with other educational institutions and THEN, if appropriate, passed on to the commercial sector in a controlled way for further exploitation. This would radically alter the current economic cycle of content provision (which costs UK HE hundreds of millions of pounds per year), and would need to be handled sensitively so as not to destabilise the marketplace too much or bring about the extinction of smaller publishers.
- content is recognised as core research infrastructure and should be equally available to all scholars regardless of where they are or what institution they are affiliated with. Innovative, high-quality, internationally-respected research cannot take place unless researchers have access to all the relevant literature.
- researchers are valued as knowledge creators who contribute actively to the economic and other successes of the UK. The current scholarly communication system reduces many scholars to donors and consumers of knowledge that is managed and owned by others.
- scholars can access all relevant resources and tools they need, including those to facilitate self-publishing, from anywhere anytime in a way that is as easy as is possible.

SCG considers that there is likely to be a relatively long period (perhaps ten years) of hybridity (i.e. a situation in which both electronic and print resources co-exist) in the supply of and access to information. Change is occurring relatively slowly and varies quite significantly across subject areas and research environments.

SCG welcomes the concept of a National Electronic Research Library bringing new opportunities to expand the resources available to users, building on the existing electronic content activities supported by the HE funding bodies. SCG strongly recommends that such an initiative is informed and scoped through the expertise already built in the community and that it should be integrated with other national activities that support e-science and lifelong learning.

1.2 Exploiting Hybridity in Libraries

SCG believes that there is a fundamental need to ensure that a number of initiatives are undertaken to enable hybrid environments to be managed effectively and the best access provided to users as possible. Many of these are already ongoing through existing Funding Council activities, such as the JISC.

In order for a mixed supply system to work as well as possible with an eye to how things might work in the longer term, a number of activities are already underway – and are supported by SCG - to help manage hybridity, particularly focussing more effectively on service delivery:

- Opening up access to catalogues of library materials (see section 5.3), e.g. support for the:
 - Serials Union Catalogue Development;
 - Other Union Catalogue Developments;
 - The Archives Hub;
 - Library and Archive Collection Description Service Scoping Study;
 - Collection Description Focus Work.
- A programme to support access to and sharing of institutional content within HE and FE and to allow intelligence to be gathered about the technical, organisational and cultural challenges of these processes, including activities to promote electronic theses, e.g. the FAIR Programme (see section 5.3).
- National electronic site licensing, e.g. support for initiatives such as the successor to NESLI and other JISC/Funding Council electronic content activities, taking into account the recommendations from the HE Content Policy Group (see section 4.5). *(NB: Please note, however, that speculation in the educational and publishing communities about RSLG plans to set up a NERL is already causing uncertainty, and is complicating the continued delivery of the JISC's current journals programme. It would be extremely helpful to co-ordinate any future community announcements and to manage expectations. RSLG should also be aware that the JISC's Journals Working Group is also currently agreeing desirable new models to prioritise for future negotiations based on community consultation).*
- Collaborative activity with publishers and learned societies, e.g. testing financial models for the future, developing consistent usage statistics, increasing publisher awareness of future technical developments and their potential impact (see sections 5.2-5.4).

1.3 Intervening Strategically

SCG believes that there a number of key challenges facing the UK in arriving at a new paradigm for the scholarly communication process. The UK and its universities need to build capacity and undertake transformative change in the way research is communicated. Capital funding will be essential to facilitate this. There is a need for successful alternative publishing modes which fulfil key requirements such as quality control and robustness through version control.

There is also a need for attitudinal and behavioural changes. This may be a generational change, although many scholars are already exploiting some opportunities available to them. Institutional behavioural change associated with new publishing modes to do with copyright and in management and charging models within institutions is also required. New developments for managing content, tools for access, costs for cataloguing, and preservation are shifting the balance of costs around institutions but this is not yet fully understood and presents significant management challenges within institutions.

SCG believes that there are a number of key areas where specific strategic interventions in the next 3-5 years will help to accelerate the pace of change. Whilst many technical issues remain to be solved, and these are being addressed through the work of JISC, there are a number of key challenges related to developing national policy frameworks.

SCG therefore **recommends** that RSLG should consider initiating and funding activities in the following areas:

- 1) Stimulate informed debate about an achievable national strategy to rectify the scholarly communication crisis, collaborating internationally where appropriate;
- 2) Provide visionary leadership for the future creation and management of scholarly content;
- 3) Reassess all stages and players in the scholarly communication process; define where costs and responsibilities lie and invest in defining desired changes;

- 4) Develop and promote multiple future models for the publishing process given the diversity across disciplines, building on the concept of evolution rather than revolution. This should be in collaboration wherever possible to ensure enhanced access by exploiting rather than re-inventing existing intermediaries such as publishers, learned societies and national libraries;
- 5) Fund a specific programme to increase innovative scholarly communications partnerships between research funders and professional societies (such as support for a subject area(s) advanced in the use of electronic media to support research), and fund a number of new pilot publishing models demonstrating sensitivity to the needs of different disciplines;
- 6) Explore a number of economic models. At present the "author pays" model seems to have promise. At least one innovative business model is being tested which allows unlimited free access for users, with the cost of editorial work and peer-review being met through a charge to the author, the author's funding body, or the author's institution. This business model is being used by BioMed Central (<http://www.biomedcentral.com>) and for one new title published by the Institute of Physics published under the SPARC umbrella. It remains to be seen, however, whether this is a sustainable business model and the search for alternatives is definitely worth supporting particularly given the diversity across disciplines.
- 7) Stimulate innovation in each phase of the scholarly communications process through key aspects such as:
- a) Considering ways to provide incentives to scholars and institutions to change their scholarly communication practices;
 - b) Scoping user needs for e-books to inform and influence production for the UK marketplace;
 - c) Encouraging the development of institutional copyright policies that improve rather than restrict access to information, e.g. by considering the IPR model being adopted by UUK and the Funding Councils regarding sensible, effective practices and procedures in handling IPR in teaching materials, and establish a parallel set of model contractual clauses for the development of research materials.
 - d) Breaking the monopoly of traditional intermediaries by building capacity in both UK universities and among researchers to effectively manage self-publication processes, such as:
 - i) Expanding the capacity of UK organisations, especially university presses, to publish e-books;
 - ii) Scoping new social and technical systems for facilitating an author, or authors', registration of new scholarly output, for example through the creation of a national infrastructure for a refereed e-print system;
 - iii) Ensuring the continued high quality of UK scholarly output by developing new discipline-specific models for certifying scholarly communications;
 - iv) Funding a major initiative to train young scholars in humanities fields to produce e-books, and to use them actively in their research. E-books present a particularly exciting new area for scholars in humanities disciplines such as history that rely very heavily on primary and secondary monographs.
- 8) Support national and European efforts to apply the same VAT rules forelectronic material as for printed material;
- 9) Ensure perpetual access to digital records, through a national strategy for digital preservation. Although some technical issues remain to be solved, many challenges relate to developing national policy frameworks. For digital preservation there is a need to clarify what should be legally deposited, articulate why scholars need such resources to be legally deposited, champion scholar's interests as legislation is introduced in the next session of parliament to govern electronic legal deposit, analyse whether there should be one or more central digital preservation repositories to ensure security through replication, and put in place national arrangements to secure long-term digital preservation in the UK.

10) Direct sponsorship of the Digital Preservation Coalition to help it deliver this national strategy on an accelerated timescale is recommended. It is achieving substantial benefits to the sector through leveraging action from and partnerships with other national organisations. Potentially it can play a key national role in co-ordinating activity and resolving roles and responsibilities.

11) A major collaborative partnership to establish a web archive in the UK and to form a core component of the national virtual electronic library collection.

12) Promote national initiatives to stimulate production and use of new types of electronic resources. These are invaluable for building capacity and quality in the UK scholarly community. Major initiatives focused on electronic books, geospatial resources, images, learning materials for research students, and time-based media are needed.

13) Develop methods for understanding end-user behaviour and requirements. Development of appropriate online tools and resources depends on this knowledge, and robust methodologies do not yet exist. Longitudinal monitoring to document and predict change is essential.

14) Endorse the need for the UK to be well-positioned to exercise influence in a variety of the Grid research areas including applications, application environments and architectures, security, content, scheduling and resource management, and performance.

15) Embed the technology and standards of the common information environment in the National Electronic Research Library.

16) Stimulate continued investment in innovative technologies to support future scholarly communication practices.

17) Consider the essential issue of marketing when scoping the NERL. Rather than advocating badging of the NERL by the BL and the HE funding councils alone, SCG recommends the creation of a portal carrying the branding of a wide-range of organisations that hold serious weight with scholars (e.g. funding bodies, research councils, professional societies, institutions). This portal should be compatible with other portals in the common information environment.

If these key strategic interventions are successful, SCG believes that they will have helped to accelerate the move from a hybrid to a digital environment and will have assisted with the cultural and behavioural changes discussed below.

1.4 Changing Cultures and Behaviours

As indicated in the above recommendations, the process of scholarly communication requires fundamental re-assessment at every stage, with great sensitivity to disciplinary differences. Process models are clear in general, but it is time to demand creativity in each stage of the process: how, when, by whom, and at what cost.

Among academics, seek to promote a number of key changes in cultures and behaviours:

- A review of the current research assessment model should be undertaken to consider its impact and to design future research assessment. SCG considers that electronic equivalents of high impact journals and monographs are needed. They also questioned whether the reduction in monographs submitted to the 2001 RAE is due to the RAE itself or whether it indicates that the economics of the creation and supply of monographs is in peril;
- Recommend to Research Councils and other Funding Council bodies that sponsor research training of the need to include courses on scholarly communication in postgraduate education;

- Commission a sample of longitudinal cohort studies to improve gaps in current understanding about authorial behaviour. There is clearly a need to learn more about the sociology of research publication and the different perspectives across the disciplines. The RAE appears to have had a tremendous influence on decisions regarding where to publish research. There is evidence to suggest that institutional departments predominantly submit research that has been published in high prestige journals. There is a need to focus on:
 - Authors in particular (academic creators);
 - The reader/retriever (information users);
 - Researchers, who are both academic creators and resource users, and who consequently need a wide spectrum of integrated tools and information resources.

Among libraries, target the following changes in cultures and behaviours:

- Librarians must recognise the need for, develop and be rewarded for specialist skills in managing an expanding range of electronic resources now required by researchers, and help to integrate these with e.g. the GRID;
- Provide new interoperable information environments for users, with seamless access to relevant resources and tools –not traditionally managed by libraries;
- Raise awareness of user-driven initiatives such as the GRID, and build a sense of shared understanding and mutual respect;
- Use information management skills to directly support research by academics through the process of information retrieval and communication;

Among senior managers, target the following changes in cultures and behaviours:

- Develop and promote awareness of institutional IPR policies, which help to expand access and the development of institutional digital preservation;
- Develop a greater understanding of how new publishing, licensing and service delivery models are shifting costs around institutions for managing content, tools for access, costs for cataloguing, and preservation;
- Design and promote institutional digital preservation policies;
- Encourage clear institutional policies on ways in which institutions should make available their library and electronic resources within and outside their own institution (i.e. distinguish between income generating and shared resources supported by Funding Council funds).

2. Introduction and Background

During 2000, the JISC arranged two meetings of an ad-hoc scholarly communications group to discuss international HE responses to the spiralling costs of electronic journal materials. The purpose of these meetings was to bring together key individuals to discuss national, and possibly international, strategies for addressing the economics of scholarly communication. The important strategic implications for funding bodies, institutional administrators, academics, librarians, and publishers were recognised and it became apparent that a high level group was needed to take forward the issues raised.

The JISC subsequently asked its Committee for Electronic Information (JCEI) to address this and a Scholarly Communications Group (SCG) was convened. The mission of SCG is to make a leading contribution to the investigation and implementation of sustainable and cost-effective emerging behaviours across the various aspects of the scholarly communications process, on behalf of the UK educational and research communities, and in collaboration with relevant national and international partners.

SCG has addressed this mission by commissioning work to inform the group and highlighting key issues that require further investigation and activity. In the first instance, the SCG commissioned a scoping study to define the term “scholarly communications” and to outline what criteria and definitions characterise a scholarly publication. This is discussed further in the next section. SCG has also more recently commissioned an analysis from the Library and Information Statistics Unit (LISU) at the University of Loughborough on trends in scholarly communication and a report from Fytton Rowland on the peer review process. The key messages from this research are integrated into this report.

In summer 2001, the Research Support Libraries Group (RSLG) invited the SCG to prepare a report to inform the work of RSLG. The SCG’s membership and terms of reference can be found at Appendix 1. RSLG’s vision and remit to SCG can be found at Appendix 2.

3. Definition of Scholarly Communications

The SCG commissioned a study to define the term *scholarly communications* and to scope the range of key issues for further consideration. This explored the concept of scholarly communications as the “communicative practice within a community, i.e. an activity engaged in by scholars who primarily want their reports to be widely read and credited by their target audience”. This focus on community, authors and target audience emphasises use as much as production.

A working definition of scholarly publications is proposed, with criteria defined as essential (E), highly desirable (HD) or preferable (P), partly based on an earlier analytical approach to scholarly electronic publishing (Kling and McKim, 1999)¹. Framing scholarly communication as a social process rather than merely as a production process means that in order to serve both authors and readers, effective publications must have *trustworthiness*, *publicity* and *access*. Scholarly publications require:

- **Trustworthiness**
 - Publications should not be changed (HD).
 - Different versions should be clearly identified (HD).
 - To satisfy all potential interest, trustworthiness should be based on ‘institutionalised’ measures such as peer review rather than on personal knowledge (HD).
 - Each publication should have at least one identifiable author (P).
- **Publicity**
 - The potential audience must be made aware that the publication exists (HD).
 - The publication should have metadata containing a minimum set of information, preferably including information about all versions (P).

¹Kling, R. and McKim, G. Scholarly communication and the continuum of electronic publishing, *Journal of the American Society for Information Science*, 1999,50(10), 890–906.

- **Accessibility: the document must be readily obtained by those who wish to use it**
 - The author must intend that the publication be made publicly available in a durable form over the long term (E).
 - The publication must be durably recorded on some medium (E).
 - The publication must be reliably accessible and retrievable over time (E).
 - There should be a commitment not to withdraw the publication (E).
 - The publication must be publicly available, i.e. available to any member of the public on demand as of right, whether for payment of a fee or not. (E).
 - The publication should have stable identifiers (HD).

There are other insightful models of the scholarly publication production process to draw upon. Five key stages in producing any scholarly communication lie between the “author” and “reader” and are identified as *registration, certification, awareness, preservation, and reward*².

- **Registration**
 - Any process by which an author, or authors, registers the fact that they have produced something new to communicate to other scholars.
 - Traditionally this is achieved by presenting conference papers about work in progress, and submitting books or journal articles for publication.
 - More recently registration has been achieved by depositing articles in pre-print services or by making drafts available on personal websites.
 - Many innovative models shift the certification process toward the author, or authors, of scholarly communications. Frequently the author is supported in the registration process by either their institution or professional society.
- **Certification**
 - Any process by which the novelty and value of a scholarly communication can be authenticated.
 - Traditionally this is achieved by peer review.
 - We have recently seen an explosion in new approaches to peer review³, and experimentation with new models such as a) open debate about quality and relevance via email by readers, b) linking readers’ assessment of relevant articles (e.g. “if you like this, also try...”), and c) personal recommendations by other scholars that a work is valuable.
 - Many of these innovative models shift the certification process toward the consumer of scholarly communications – the reader – and open the certification process.
- **Awareness**
 - Any process by which potential readers are alerted to the availability of a scholar’s communication.
 - Traditionally this is achieved by publication in a book or journal, and marketing of that book or journal by its publisher. Awareness has traditionally been facilitated by inclusion of abstracts and indices in secondary database, and provision of library catalogues to local holdings.
 - More recently awareness has been recognised as a major challenge in scholarly communication, and is the focus of concerted research in the UK⁴ and abroad. Models that have been explored include collaboration between libraries to catalogue free web-based resources, a rise in the availability of union catalogues, and creation of tools to allow simultaneous cross-searching of multiple primary and secondary databases.
 - It is not yet clear where primary responsibility for awareness will lie, but intermediaries between authors and readers will be required to manage this process for some time and investment in national infrastructure is required.

² Hans E. Roosendaal, Peter A. Th. M. Geurts and Paul E. van der Vet, "Developments in scientific communication: Considerations on the value chain". *Information Services and Use*, 21 (2001) 13-32; Hans E. Roosendaal, Peter A. Th. M. Geurts and Paul E. van der Vet. "Higher education needs may determine the future of scientific publishing", <http://www.nature.com/nature.debat/e-access/Articles/roosendaal.html> ; Harry Hummels and Hans E. Roosendaal. "Trust in Scientific Publishing". *Journal of Business Ethics*, 34 (2001) 87-100 ; Hans E. Roosendaal, Peter A. Th. M. Geurts and Paul E. van der Vet. *Integration of Information for Research and Education: Changes in the value chain?* April Serials issue.

³ Rowland J.F. *The Peer Review Process: A Report to the JISC Scholarly Communications Group*, May 2002

⁴ Notably through JISC funding programmes to support the creation of electronic libraries (the eLib programme) and the creation of a distributed national electronic resources (the DNER development programmes).

- **Preservation**
 - Any process by which the long term availability of a scholarly communication is assured to enable future scholars to return and verify earlier results and analysis.
 - Traditionally this is achieved through many libraries holding duplicate print copies on their shelves.
 - More recently international attention has focused on the need for, and deep challenges of, digital preservation strategies and facilities⁵. Innovative models and pilots are beginning to emerge.
 - It is clear that substantial further research and development is required, and that neither authors nor readers will be able to manage the preservation process. Institutions and professional societies will undoubtedly play a role, but intermediaries and investment in national infrastructure is required.
- **Reward**
 - Any process by which the author, or authors, of a scholarly communication receives benefit for making scholarly communications available.
 - Traditionally achieved through modest payments to authors, citation by scholars, tenure, and inclusion of articles in the RAE.
 - Further discussion and research is required to develop innovative views about rewards to authors, readers, institutions, and others (e.g. libraries, publishers, archives, professional societies) that facilitate the scholarly communication process. Many rewards are intangible and indirect. Rewards are also routinely criticised for being under- or over- priced with little evidence of actual value to support current practices.

To this model it is desirable to add *use*. For too long attention has focused on authoring, purchasing, and managing access to scholarly communications without much attention paid to their impact. Developing measures of the long-term impact of use on the quality of learning, teaching, and research would introduce a powerful feedback mechanism to the certification, preservation, and reward processes.

All forms of scholarly communication, whether in print or electronic media, are in the scope of this report. In the context of electronic media, the term “scholarly publication” commonly refers to all forms of online distribution of documents (Kling and McKim 1999). This reflects the conceptual blurring with regard to informal and formal modes of communication in an electronic environment. Meadows in 1998⁶ defined informal modes of communication as “often ephemeral and... made available to a restricted audience only” and formal modes as “typically available over long periods of time to a restricted audience only.”

The distinction between formal and informal communication formats is more problematic when a document is designed as a permanent record of research. Examples include conference proceedings, preprints, theses, reports, journal articles and monographs. All but the latter two are generally categorised as “grey” in a print environment because they can be difficult for users to identify and access. The electronic environment makes these more accessible, thus moving them further along a scholarly publication continuum. Formats that are “grey” in a print environment may, in an electronic environment, fulfil some of the functions of a scholarly publication more effectively than the archetypal formats to which Meadows referred. Clearly the electronic environment facilitates publication in a wider range of media. This is likely to result in a greater variety of formal formats and added benefits such as hyperlinking citations and the facility to append comments to a scholarly work, provided effective tools exist for navigating, filtering and maintaining published content.

In conclusion, the SCG looked broadly at scholarly communications as social processes fundamental to the core function of higher education. The process of scholarly communication requires fundamental re-assessment at every stage, with great sensitivity to disciplinary differences. Process models are clear in general, but it is time to demand creativity in each stage of the process: how, when, by whom, and at what cost.

⁵ In the UK this work is led by the Digital Preservation Coalition, an organisation with 19 core members including libraries, publishers, and research funders.

⁶ Meadows, A. J. *Communicating Research*, 1998, San Diego: Academic Press, p. ix.

4. Trends in Scholarly Content and Library Purchasing

4.1 Scholars' Perceptions

The range of resources required by scholars is expanding rapidly. Traditional library resources such as books and journals are no longer entirely sufficient to support scholars. The spectrum of required resources includes:

- Contact with Colleagues
- Directories of academic expertise, library and computing resources, laboratory facilities, etc.
- Electronic catalogues of print and non-print collections
- Images
- Maps
- Moving pictures and multimedia resources
- Primary data archives
- Sound files
- Web sites
- Search engines
- Resource discovery tools
- Finding aids
- Software
- Records of lab experiments, finances, etc.

The emergence of an e-science community is extremely welcome, and will empower scholars to articulate their changing needs. The SCG has strived to think in the broadest possible terms about these changing needs, and the ever-expanding range of resources required for scholarly activities. This presents a challenge, however, as many current discussions about scholarly communications are focused on scholarly monographs and journal articles rather than on the full range of required resources. The changing needs of scholars emphasises the urgent need to fundamentally re-assess every stage of scholarly communications, with great sensitivity to disciplinary differences.

Internationally, many of the issues discussed below – for example the Open Archives Initiative and the various scholarly communications programmes of SPARC – are being welcomed and actively engaged in by scholars. Many scholars are outraged by the unsustainable economic regimes that have grown up around the intellectual property that they give away so freely, just as they are frustrated by the access barriers barring them from core resources.

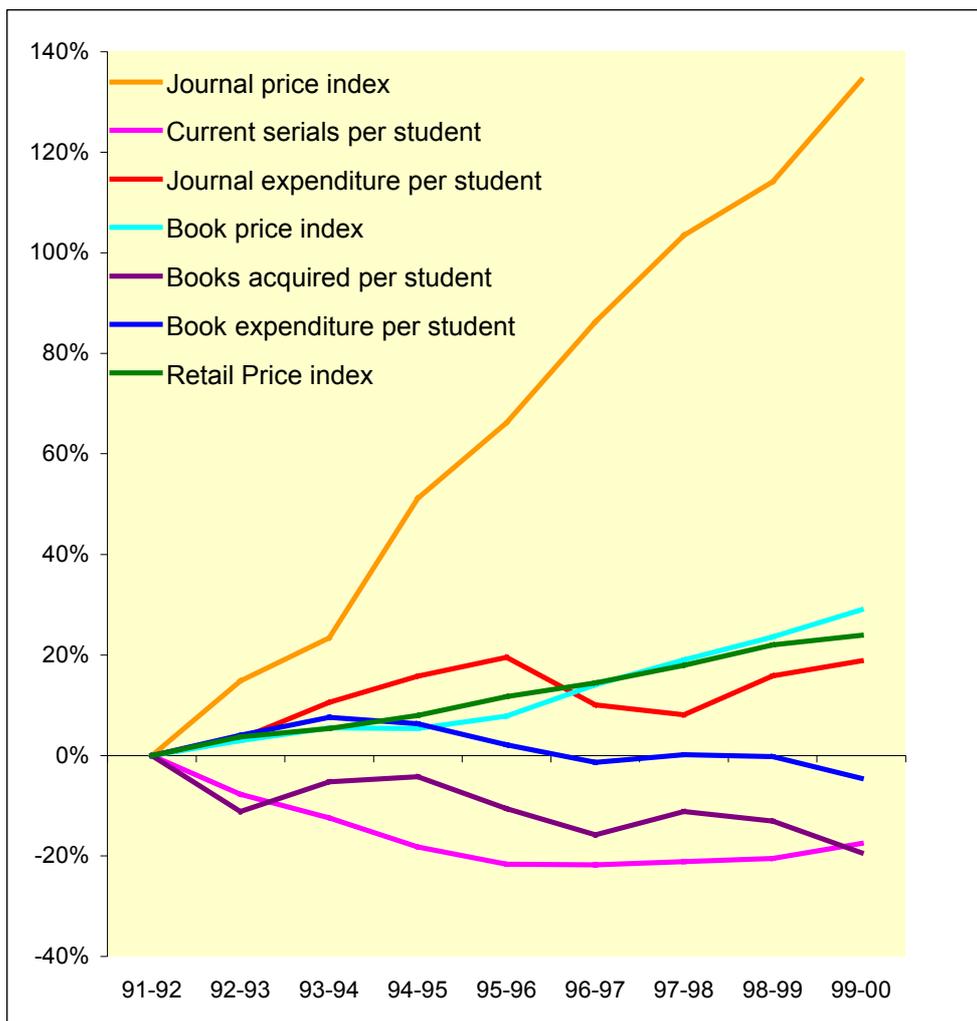
4.2 Library Perceptions

Libraries are confronted with an explosion of information in both printed and electronic formats and a plethora of newly arising publishers and aggregators of digital services and resources. Librarians must manage the integration of multiple and heterogeneous resources with their primary goal of servicing a defined community of users.

Evidence suggests that the number of electronic resources being submitted by voluntary deposit to the British Library and to the other UK legal deposit libraries is increasing. The number of purely electronic submissions (journals and newsletters in PDF or HTML format) appears to be increasing at the most significant rate, though it is not clear at this stage how these submissions break down into the categories of scholarly journals or grey literature. Mainstream online scholarly journals are not yet systematically included in the main provisions of the voluntary scheme. Submissions of electronic monographs (CD-ROMs, floppy disks, e-books) are relatively few in comparison to serial submissions.

There is considerable agreement across the world of scholarly communications on both the opportunities and difficulties in the changes underway. The key issue is recognised to be the way in which access to academic information is restricted by the present scholarly publishing structure. In the USA and Europe there has been considerable discussion of the barrier to access erected by publishers through restrictive copyright and licensing policies, while in both the developed and developing world a major barrier has been the issue of affordability.

The graph below and statistical information within it were compiled from SCONUL Statistics by LISU, the Library and Information Statistics Unit at Loughborough University. It shows the rise in the price of journals in relation to general inflation rates and the decline in the number of journals purchased.

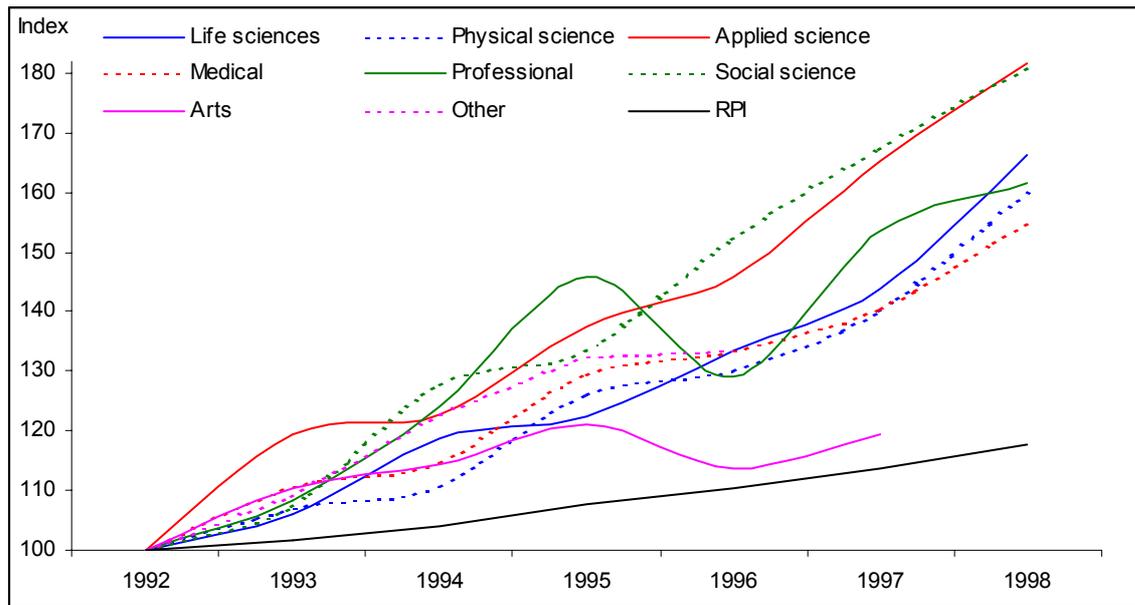


However, if the trends in annual average price per editorial page are analysed (see graph from LISU overleaf), it can be seen that whilst all subjects have increased their page prices by more than the rate of general inflation, there is considerable variation between subjects, with Applied Science and Social Science recording the most dramatic increases.

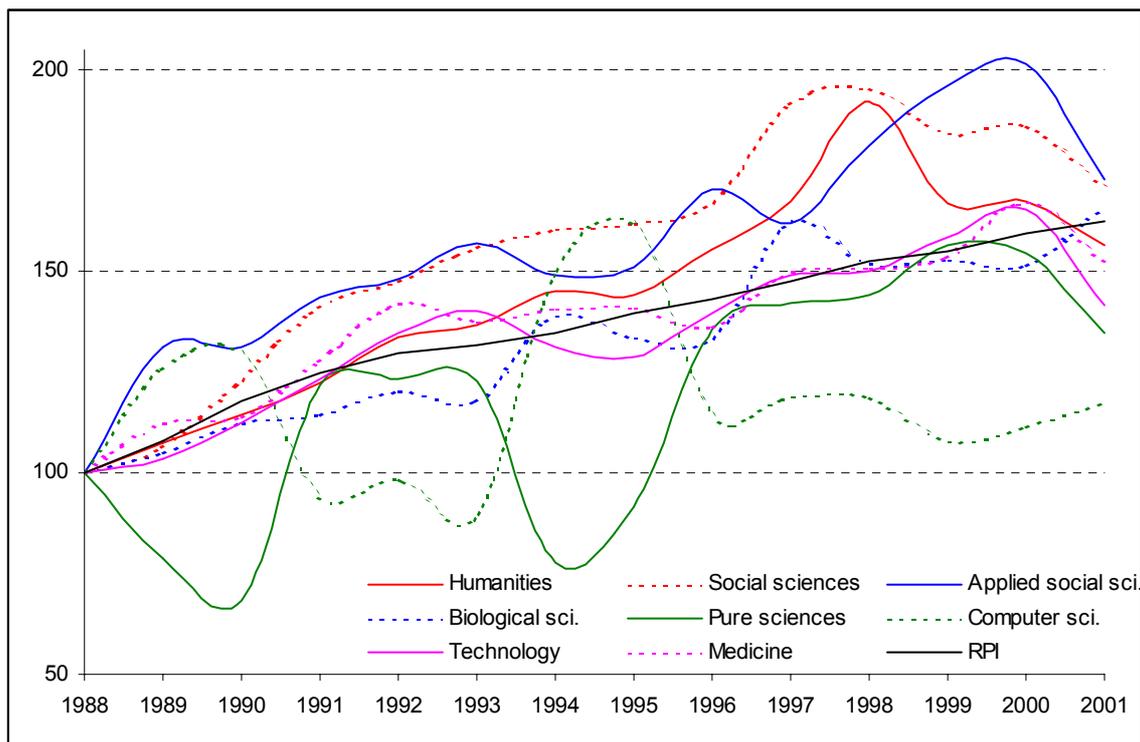
The exponential rise in the cost of STM journals has been affecting every university in the world. Fluctuations in exchange rates have also intensified the inability of library budgets to cope adequately and these factors have acted as a catalyst for the discussion of broader scholarly communication issues. Another driver for change has been the pervasive growth of the Internet, which has created opportunities for improvements in the communication of teaching and research materials but has also created other concerns, for example the ease with which academic information can be copied or altered without proper controls.

An analysis of the average price of academic books published in the UK and US indicates that whilst in general terms the increases in academic book prices have been broadly in line with more general inflation rates in the UK and considerably less extreme than increases in periodical prices, there are considerable differences between, and fluctuations within, subjects. The second graph overleaf, also provided by LISU, illustrates these trends in annual average price in eight broad subject areas. It can be seen that there are extreme oscillations between subject areas. It is therefore important to emphasise the need to take a long-term view of trends. If trends are generalised without acknowledging differences across subjects, a misleading picture can be presented.

Average price per editorial page



Index of UK academic book prices



4.3 International Scholarly Communication Initiatives

Much of the activity in most countries has been aimed at raising awareness of the key issues within the academic community. In the USA one of the first activities of SPARC, the Scholarly Publication and Academic Resources Coalition (<http://www.arl.org/sparc/>), was the "Create Change" leaflet, which has now been adapted for UK use by SPARC Europe. The Council of Australian University Librarians (CAUL) has established a programme called the Coalition for Innovation in Scholarly Communication (<http://www.anu.edu.au/caul/cisc/#activity>). Under this programme a series of reports has been

commissioned to inform universities of the situation, such as the economic model under which scholarly publishing currently operates. One of the bases of the present economic model is the assignment of copyright, and in the US and the UK a key change is perceived to be the need for academic authors not to assign exclusive copyright to publishers. The Tempe Principles (<http://www.arl.org/scomm/tempe.html>), endorsed by the Association of American Universities, combine a respect for academic freedom with a call to authors to use that freedom responsibly in not assigning exclusive copyright to commercial publishers. In the Netherlands an organization in which all fourteen Dutch universities participate, Innovatie Wetenschappelijke Informatie Voorziening (known by its initials IWI), <http://www.surf.nl/iwi/portal.htm>, has agreed a copyright policy which identifies the circumstances under which a university may be regarded as the copyright owner and a model licence which academic authors might use to prevent all exploitation rights accruing to commercial publishers. It aims to achieve a fair and workable balance between the legitimate interests of academic staff and universities. Whatever particular measures universities across the world are taking, the wish to achieve that balance appears to be common to all.

A powerful agent for change may also be the availability of new publication outlets, such as academic websites or e-print servers. These new publication outlets may offer authors fast, low-cost and high-quality publication in addition to or as an alternative to publication in conventional journals. This development is beginning to introduce competition into what is at present a virtual commercial monopoly in journal publishing. Various academic organizations across the world are developing these new publication outlets, including universities in the UK with funding from the JISC. Academic institutions are maintaining websites that link to the text of articles and papers written by their staff. If the host-institution is a high-quality institution, the posting of papers to its website could be seen to be a certificate of quality. New e-print servers (following the long-running success of the Los Alamos Archive) are also being established which aim to maintain academic quality through peer-review. In an initiative to be announced shortly, the development of such alternative publication outlets will be supported by the Open Society Institute, which is funded by the Soros Foundation.

A related development is the Open Archives Initiative (<http://www.openarchives.org/>), which has grown into a highly visible effort by scholars to facilitate access to free literature. It is underpinned by a conceptual distinction between content repositories, and access services that sit above those content repositories. The OAI community feels strongly that all content should be made freely available by authors and institutions, and that payments should be made on the basis of value-added services that are provided to support scholarly communications activities. The radical new idea here is that in future publishers could not charge inflated prices simply because they control exclusive content. Instead, a range of intermediaries, including publishers, would compete on the quality of their access systems and the ease with which they empowered the discovery and use of content by scholars. The importance of this basic vision for the future transformation of scholarly communications cannot be over emphasised. The OAI community is also working closely with computer scientists to develop tools to make distributed content repositories more accessible and searchable. Key among these developments is the publication of a protocol through which collection descriptions and other free cataloguing information can be 'harvested' and shared. If implemented widely, the OAI Protocol could dramatically improve access to academic publications.

A different type of new publication outlet is being offered under the auspices of the Scholarly Publication and Academic Resources Coalition (<http://www.arl.org/sparc/>). SPARC has set up partnerships with not-for-profit or learned society publishers to produce new low-cost journals which compete head-to-head with specific expensive journals and is also assisting learned societies which might hand over their titles to commercial publishers to move into low-cost electronic publication. SPARC is having an impact upon some journal prices, although its long-term success must lie in being part of a wider movement for change in scholarly communication.

Meanwhile librarians are continuing to seek to secure better value from the present structure, particularly by acting collectively through consortia. The International Coalition of Library Consortia (<http://www.library.yale.edu/consortia/>) has in membership consortia representing tens of thousands of libraries from every continent. The structure of each consortium is different, and their functions also differ, but their mission statements generally have much in common. Many consortia have found that by combining the purchasing power of their member libraries, they can achieve cost savings in the purchase of journals and datasets.

4.4 RAE Impact

The Research Assessment Exercise (RAE) invites Higher Education Institutions (HEIs) to list up to four research outputs for each member of their staff whom they select as research active. All forms of output that embody the results of original research may be included. Although only one part of the evidence presented to assessment panels in submissions, the listing of research outputs provides the primary evidence for research quality to most RAE panels, and is a significant driver of the grade awarded in all cases. Assessment panels review all outputs listed and read or otherwise examine in detail a proportion of them (typically 25%). Fewer than 20% of panels in 2001 read all outputs in detail. In order to form a judgement on the quality of the work, where applicable, reference is made to the refereeing and reviewing standards applied to outputs by the relevant journal or publisher. In the absence of such pre-existing marks of quality, however, panels are not permitted to assume the work is necessarily of lower quality, so they often target their detailed reading on un-refereed or un-reviewed work. They may, of course, also read work that has been refereed in order to test the assumptions they are making about its quality. Virtually all panels arrive at a preliminary grade for each submission on the basis of the research outputs and then confirm or modify it in the light of other evidence in the submission.

If the research outputs by type between the 1996 and 2001 RAEs are compared, for 2001, the number of categories in which outputs could be presented was expanded considerably, particularly in recognition that the "All Other Works" category in 1996 was too broad to be meaningful. The additional categories which had previously made up "All Other Works" were patent/published patent application, software, report (confidential) for external body, internet publication (via subscription), performance, composition, design, exhibition, artefact, scholarly edition, other form of assessable output. However, despite the increase in type of outputs permitted, articles in journals submitted to the RAE increased from 62% of total outputs in 1996 to 69.7% in 2001.

The database of outputs submitted to the RAE is an important source of information about changing trends in patterns of scholarly communication. It must be remembered, however, that work returned to the RAE represents only a proportion of all research publication and scholarly communication. The work submitted has been selected on the basis of perceptions about what will be regarded most readily as of high quality by assessment panels. Those perceptions have a distorting effect on the body of work submitted and may make it unsafe to regard the RAE database as a truly representative sample of current patterns of scholarly communication. The RAE itself, moreover, may be exercising a substantial influence on changes in scholarly communication, potentially inhibiting more innovative developments if they are regarded as less "safe" in demonstrating quality. The increase in journal articles submitted in the 2001 RAE, despite considerable efforts to stress the equitable treatment of all forms of work, suggests that institutions remain unconvinced about the value placed on other forms of output.

Furthermore, many journals are organised on a fairly conservative disciplinary basis, so the disincentive may extend to engagement in interdisciplinary or multidisciplinary research, whether applied or not. This issue, indeed, has been identified as a difficulty with research evaluation mechanisms across Europe. The perceived pre-eminence of journal article dissemination may also offer a disproportionate advantage to journal publishers in controlling modes, and hence the overall cost to institutions, of scholarly communication. Internet publication has also presented major challenges to assessment panels, which may be indicative of wider academic concerns over quality assurance of work published on the Web. Although comprising only a small proportion of the total in 2001, Internet publications appear anecdotally to have been of very variable quality. In the absence of quality "hallmarks" attaching to work published in this way, its value, for academic research even more than simply for RAE assessment, will remain limited.

4.5 Consortial Licensing

As outlined above, library consortia have sprung up worldwide to lead the collaborative licensing of electronic resources on behalf of members. Brought together by the International Coalition of Library Consortia (ICOLC), purchasing directors meet 3 times per year to compare notes and to develop complementary negotiation strategies.

The value of consortial licensing programmes has been demonstrated worldwide, although there is still debate about the appropriate way to present this information. It is quite common for consortia to compare their negotiated price to the list amount each member would have paid. For example, the LOUIS consortium has spent \$23M on automating Louisiana academic libraries and purchasing access to electronic resources for academic and public libraries. Had each site purchased these products and services separately they would have spent an additional \$43M over and above the \$23M. This method of valuing consortial licensing produces eye-popping headlines, and claims of hundreds of millions of pounds in savings to universities, but does not present an entirely accurate picture.

A more accurate way of presenting information about consortial savings is in documenting cost avoidance. For example, the Virtual Library of Virginia (VIVA) has brought \$90.9 million of valuable subscriptions and other electronic resources to the 39 public colleges and universities for only \$16.3 million, representing a cost avoidance of \$74.6 million. VIVA does not refer to this figure as *savings* since the member libraries never held the \$90.9 million represented by the publisher's list costs. The actual value to individual member libraries is difficult to pin-point. Some comes from the fact that the VIVA consortium has been successful in lobbying its state government for some top-sliced funding of content deals. Benefits also extend beyond these cost avoidance figures as VIVA participants report added value in terms of improved analysis and group decision-making, professional development for library staff members, etc.

Attempts to value the California State University system's Electronic Core Collection also highlight the many important, but intangible, benefits of consortial licensing. The collection provides substantial, in-depth coverage of the scholarly journal literature in the subject areas most widely represented on system campuses. Wherever possible, the ECC also provides for seamless linking to other licensed electronic resources as well as to local and union catalogues. CSU libraries are thus able to provide equal access to resources from all locations where students and staff wish to work. CSU libraries have further benefited by consolidating purchase orders for common services and resources, and leveraging their purchasing power to gain important licensing terms for members. This has resulted in both increased savings and more cost-effective access to the resources required to support teaching, learning and research.

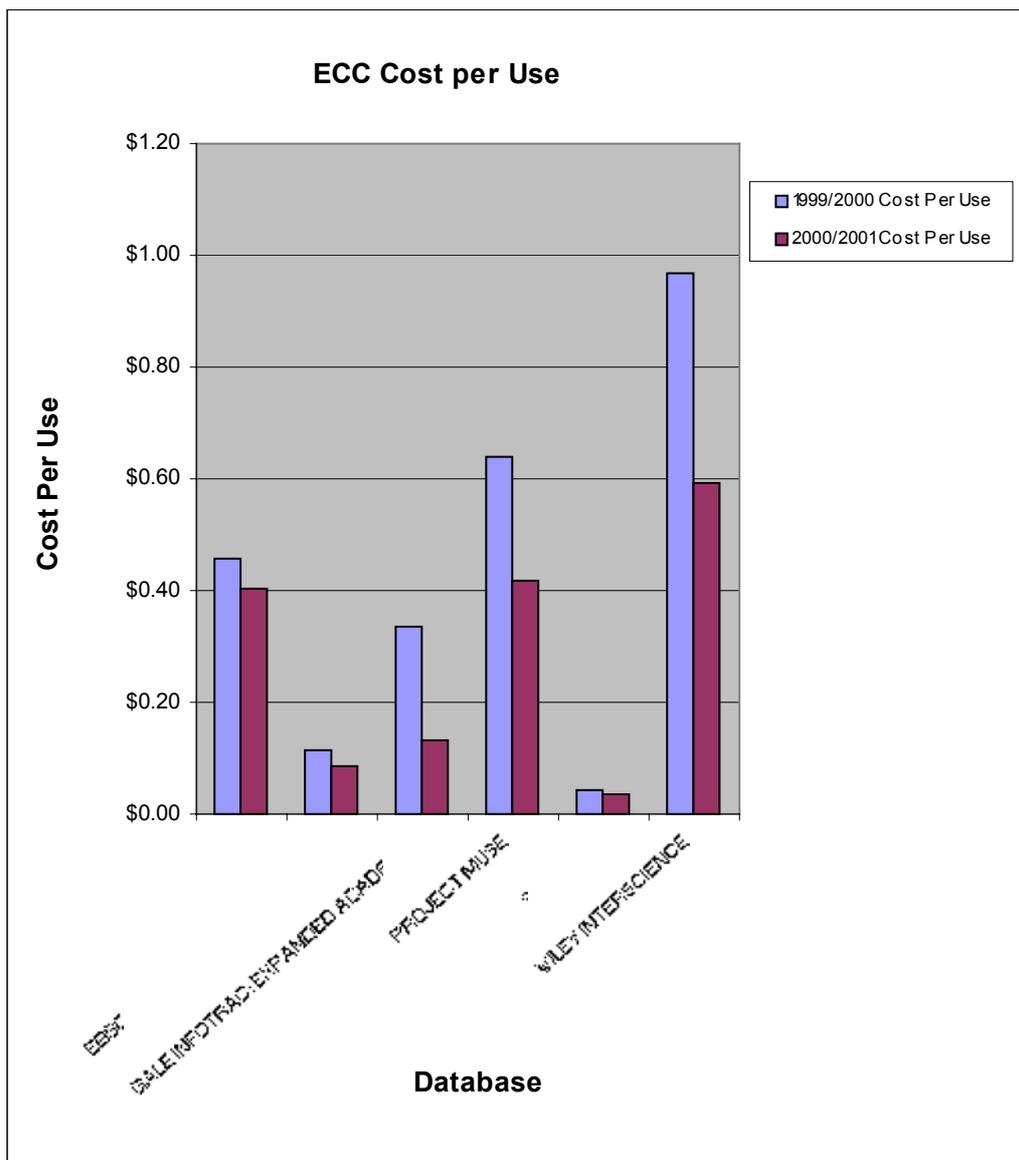
As evidence of such savings CSA can show that where the cost of key information resources have increased over past years, unit costs (per usage) have declined in greater proportion. The enclosed graphic overleaf compares the cost per use for six ECC resources over a two-year period. During this period the rate for these resources increased an average of 7% annually while usage increased 74%. The result was an overall decrease of 32% in cost per use.

In the UK, involvement with the international consortial licensing community has been led by the JISC through its content programmes, and guided by its 3-year national collection strategy. Recent community consultation about the JISC's Collections Strategy has indicated continued support and recognition from senior managers for national content activities. The JISC's content programme has evolved over 11 years and provides materials essential to the UK's research base. The programme is now actively being extended to support the learning and teaching base. Key achievements include:

- Unit costs of electronic information driven down by pooling the purchasing power of the sector;
- Efficiency gains for the sector by producing better value for money through national negotiations than individual institutions could have achieved;
- Expanded access to information by an ever-increasing proportion of educational institutions with annual increases in usage levels (still no sign of a plateau).

4.5.1 *Journal Initiatives in the UK*

One strand of concerted activity in the UK since the 1995 Pilot Site Licensing Initiative (PSLI) has focused on journals. The National Electronic Site Licence Initiative (NESLI) was a three-year JISC programme to deliver a national electronic journal service to the UK higher education community. Its key objectives were to lessen the financial, legal and technical barriers to the widespread take-up of electronic journal provision in the UK higher education community. It formed, and continues to form, one strand of the JISC's activities to create a portfolio of high quality electronic collections and services designed to support learning, teaching, and research in the UK.



The NESLI service is currently funded by the JISC and provided by the University of Manchester and Swets Blackwells. The service provider was set up to negotiate value-for-money deals with leading scholarly publishers, handle subscriptions, provide a single interface for access, and provide technical support. Journal delivery commenced on 1st January 1999. NESLI was always controversial, but in the end successful in making significant progress in a rapidly changing and extremely challenging area. The many stakeholders had different and often conflicting requirements for a national e-journal service, and this created a controversial environment. Evaluation of NESLI in 2000 revealed that:

- There is widespread support from all stakeholders for the principle that there should be a single negotiating body on behalf of UK universities;
- Progress in agreeing deals, getting them accepted by libraries and achieving end-user take-up was slow because of the complexities inherent in the process. There are continuing signs of gathering momentum and support from all the necessary stakeholders;
- The NESLI model licence had been a major success in providing a framework for licensing significant electronic content;
- The different profiles of institutions means that a single offer cannot meet all needs and NESLI agreements have effectively democratised access for scholars in medium and small institutions;

- Evaluating and brokering complex deals in a limited timescale led to many institutions being unable to take up offers;
- Offering access through a single portal had advantages for end-users but was seen as a restrictive commercial practice;
- NESLI was a significant advance in the way new business deals are transacted in the developing electronic marketplace and was closely monitored in many other countries.

In the US and Australia, libraries are now spending significantly more to acquire fewer titles than ten years ago. Prior to the widespread acceptance of NESLI deals, the total number of titles being taken by HE libraries was relatively stable; it has since shown signs of a slight increase while the average price paid has fallen⁷. This possibly reflects a tendency for libraries to subscribe to less expensive titles, but easy analysis is elusive because of the number of effectively 'free' titles bundled into NESLI deals.

Up-front payments significantly strengthen the sector's ability to negotiate better prices and key technical developments (e.g. ATHENS authentication). The journals programme has been virtually self-funding. The Funding Councils passed responsibility to the JISC for establishing and managing NESLI following its pilot project, PSLI. The Funding Council mandate required NESLI to be self-supporting after 3 years with full cost-recovery from institutional budgets. Evaluation of the NESLI initiative during 2000 indicated that the swing went too far toward self-funding in the follow-up to the PSLI. The consortium employed to undertake NESLI negotiations was forced to rely on commissions granted by publishers to fund their activities, and the negotiating power of the higher education sector for better journal deals was compromised. According to SCONUL estimations, the journals market in UK HE is worth around £80M per year and is characterised by unacceptable annual price rises. Institutions annually pay more for access to less, and it is right to name this a "serials crisis". Strengthening national journal negotiations is an imperative endorsed by the UK community. Up-front payments to suppliers would substantially increase the sector's negotiating power, while allowing more flexible cost-recovery from UKHE institutions.

Recommendations:

- **The SCG heartily welcomes the idea of a National Electronic Research Library. Please note, however, that speculation in the educational and publishing communities about RSLG plans to set up a NERL is causing uncertainty, and is complicating the continued delivery of the JISC's current journals programme. It would be extremely helpful to co-ordinate community announcements and to manage expectations.**
- **RSLG should also be aware that the JISC's Journals Working Group is currently agreeing desirable new models to prioritise for future negotiations based on community consultation.**

4.5.2 *Book Initiatives in the UK*

The JISC convened an Electronic Books Working Group in 2001 with the following objectives:

- To monitor the e-book industry worldwide and influence its development for the benefit of further and higher education in the UK;
- To secure cost-effective access to a comprehensive and relevant collection of electronic books for universities and colleges;
- To achieve sustainable economic models for electronic books;
- To assess the impact of new hardware and software, emerging e-book standards and digital rights;
- To encourage the option of electronic publication for authors whilst maintaining a realistic view of new technology;
- To take a balanced view of the role of e-books and understand how they can be integrated effectively into learning and research.

⁷ Page 2, LISU Report to JISC Scholarly Communications Group: Trends in Scholarly Communication: Output, Access and Use Issues, May 2002.

This working group published a well-received issues paper on shaping a UK strategy for e-books⁸. The term 'e-books' is defined broadly and includes electronic reference works, monographs and textbooks delivered via the Web or a hand-held device.

Alongside traditional book publishing companies, many powerful players have entered the emerging e-book industry, but at the same time these businesses have experienced many of the fluctuations of the dot.com 'revolution':

- Phase 1: Rapid expansion during the 1990s. Considerable venture capital spent on digitisation (e.g. NetLibrary, Questia and Ebrary);
- Phase 2: Tightening of the capital markets, forcing many e-book publishers and aggregators to drastically reduce their overheads. Slower pace of book digitisation;
- Phase 3: Emphasis on the need to generate actual revenues by increased sales.

Industry forecasts for e-books have fluctuated markedly. Accenture (formerly Andersen Consulting) predicted a strong market for e-book content by 2005 and Forrester has forecast big rises within the same period, with a quarter of textbook sales going electronic. Consulting firm IDC foresaw fast growth in demand between 2000 and 2004. Jupiter has concluded that e-books will make up 6.5% of college textbook sales by 2005 whereas PricewaterhouseCooper predicts one-third of textbooks will be sold electronically in the US by 2004.

On the question of the future of e-book aggregated services, Eduventures, a US consultancy, estimates the current market at \$250 per annum and forecasts it to triple by 2004 to \$850m. Evidence collected by the JISC working group now supports Eduventures prediction that market growth will not be quick enough, however, resulting in restructuring, corporate acquisition and, ultimately, failure for some. Success factors, based on Eduventure's research, include extensive and exclusive content, integration with other online resources, a strong connection with the curriculum and the ability to tailor to end-user needs.

The first of an annual survey of publishers on their changing perspectives of e-publishing has recently appeared. The vast majority of publishers reported that they are now involved in electronic books, either by dedicated hardware, print-on-demand or online delivery. Interestingly, a greater number of publishers are considering online delivery of books via the Web rather than for hand-held devices. Digitisation of backlists was considered to be a problem for publishers and only 4% of 61 respondents said that 100% of their content was digitised and in a readily-accessible digital library. The amount of content available in digital form ranged from 5% of a publisher's titles, to 100%. There was evidence that most new content is digitised as a matter of course.

Publishers and intermediaries are re-thinking distribution channels for the electronic environment, ranging from a direct publisher-reader relationship to a complex chain involving many intermediaries. Many of the publishers interviewed for the annual survey on e-publishing expressed the view that online delivery would impact strongly on the existing supply chain. The NESLI evaluation has highlighted some of the issues that must be considered when developing economic models for e-books:

- Necessity of flexibility for institutional collection building, and tailoring to local user needs;
- The challenge of handling different budgeting practices (devolved or centralised approaches in institutions);
- The need for flexibility in providing a choice between bundling and unbundling (purchasing individual titles versus subject bundles of titles).

Other specific concerns for e-books include:

- The likely take-up of e-books by specific user segments within the community;

⁸ See <http://www.jisc.ac.uk/dner/ebooks/strategy1.html>

- The relationship between end-user purchase and library purchase, in particular for student textbooks;
- The role of the library, campus or online bookseller and institution in end-user purchasing;
- The appropriate economic models for different types of e-books e.g. reference textbooks, scholarly monograph books;
- Consideration of new business models e.g. leasing of textbooks for a specified period for electronic short loan collections;
- The potential for resource sharing within a consortial deal;
- The continuing need by some libraries to buy both print and electronic versions of a text.

Publishers have also expressed an interest in some form of joint market research. They would like to know whether to go for depth e.g. in key subject areas, or breadth across a range of subjects.

Publishers are also eager to use technology to re-build the relationship with libraries and the end users, sensing that they have lost direct contact and so lack hard evidence on how their material is being acquired and used.

An e-book marketing strategy should determine the role of JISC, librarians, publishers and other stakeholders in promoting e-books. E-books seem to offer a unique opportunity for a range of stakeholders to be involved in building collections and in working on innovative projects. In law and in business studies, for example, we already have evidence that publishers, librarians and faculty would work together to define a core collection of e-books and to produce ideas for new types of electronic book products.

The impact of technology on book authoring should be examined. The challenge with e-books is to produce content that exploits the electronic environment but which also enhances the reading and learning experience for the end-user. Appropriate projects are likely to involve partnerships between various stakeholders, including authors, university presses, libraries and commercial publishers and distributors.

A survey of US university presses undertaken in 1999 in the United States showed that development costs, lack of demand and doubts about online reading were major barriers to undertaking e-publishing projects (Siler, 1999). Reference books were seen as the most likely targets for e-publishing, because of the ease of searching and updating content. (This is reinforced by the take up of e-reference material by libraries in the UK). The primary influences on e-publishing were seen as technological advance and availability, rather than influences from the marketplace such as the size of the library budget or decreasing sales of monographs. Technology was seen as key to improving the presentation and distribution of content to users. Those who had not ventured into e-publishing gave lack of resources as a key reason. Clear market demand and more resources were the basic requirements that would encourage presses to enter into e-publishing.

The foremost project to promote co-operation between stakeholders and encourage new approaches to e-book publishing is the History E-book Project. The American Council of Learned Societies has a \$3m grant from the Mellon Foundation to work with 7 university presses, including Oxford, Harvard and New York, on history e-books. The aim is to encourage university presses to digitise their works and for authors to consider new forms of electronic publishing. A mix of front-list and back-list titles are included. The project encourages presses to acquire in-house expertise, to develop technical standards and software, rather than just mainstream conversion. It also seeks to promote collaboration between learned societies, university presses, academics and libraries.

Recommendations:

- **Expand the capacity of UK organisations, especially university presses, to publish e-books.**
- **E-books present a particularly exciting new area for scholars in humanities disciplines such as history that rely very heavily on primary and secondary monographs. Funding for a major initiative to train young scholars in these fields to produce e-books, and to use them actively in their research is recommended.**
- **There is also a need to scope user needs for e-books to inform and influence production for the UK marketplace.**

4.6 Uncertainties about New Pricing Models

Uncertainties about new pricing models are hindering the transition from print to electronic. For electronic journals, the library community has clearer ideas about future pricing models than the publishing community. The recent ICOLC up-date on the licensing of electronic content describes a preferred pricing model based upon an electronic-only base price of no more than 80% of the electronic-plus-print price, with the combined print and electronic price being no more than the current print-only price. For monographs or individual chapters in electronic format, no clear pricing model has emerged as yet, although JISC is funding a scoping study of this topic. Also in an experimental stage are new business models based upon free access for users with publishing costs recouped from authors or their institutions.

The publishing community faces a big challenge in its response to such initiatives. Most publishers appear willing to experiment with new pricing models but wish to protect their existing income through no-cancellation clauses, three-year commitments, or deals which are structured to yield a certain level of revenue. No-cancellation clauses in particular are a major barrier for libraries wishing to make the transition from print to electronic.

Libraries also face a major difficulty in moving away from print-based pricing models due to the fact that VAT is chargeable at the full rate on electronic materials and is waived entirely for printed materials.

Recommendation:

- **RSLG should put its weight behind national and European efforts to apply the same VAT rules for electronic material as for printed material in order to resolve this issue to the satisfaction of the research community.**

4.7 Intellectual Property Rights (IPR)

NESLI and other consortial licensing programmes can be seen as initiatives which have decreased the cost to institutions of supporting scholarly communication by harnessing the purchasing power of UK higher education in order to attract deep discounts from publishers. A fundamental factor in the ever-increasing prices of journal subscriptions is, however, outside the scope of these initiatives: the supply of scholarly materials to publishers and their journals. Academics produce articles with the benefit of public funding, and then pass this intellectual property to publishers. The passage of intellectual property to publishers rarely results in the retention of usage rights by academics or their institutions, and is generally done with little or no payment (in some cases the academics even pay the publisher to take their materials). There are three main future issues between individuals and institutions in relation to intellectual property rights: ownership, control and policing.

The assignment of copyright by academic authors to commercial publishers using agreements drafted by the publisher has had a detrimental effect upon scholarly communications. The publisher's copyright agreement usually allows the publisher to place restrictions upon access when the content is licensed to individual users or to libraries. When content has been needed by a university, the publisher has requested payment even when the content has been written by a member of the academic community, while publishers themselves have been free to re-package the work of academics and gain further profit. This copyright imbalance in favour of publishers has led many universities to re-consider their institutional copyright policies.

The analysis in this document is based upon a snapshot of institutional copyright policies taken in December 2001 from a broad range of UK universities asking for information about their institutional copyright policies. The replies showed no discernable difference in policy between large or small institutions. The large majority of the policies allow academic members of staff to retain copyright in practice, but there is considerable variety in the way in which copyright ownership is described. However, the practical effect of all the policies surveyed is the same: whatever the legal position, universities generally allow members of staff to exercise copyrights in publications. There are, however, safeguards built into many institutional policies to protect the university's interests, and such safeguards appear more frequently in the policies introduced recently. These reveal the interest of institutions in rights to electronic content, while not wishing to restrict members of their staff in the legitimate exploitation of their work. Safeguards are also being introduced into institutional copyright

policies to prevent loss of income to commercial bodies, particularly in ensuring the right to use books and journal articles written by academic staff. Some institutional policies encourage staff to retain copyright rather than assign it to a commercial organisation.

Although most policies surveyed do not distinguish between teaching and research publications, those that do distinguish currently place more emphasis upon protecting the institution's interests in respect of teaching materials. One specific situation faced by institutions is the transfer of teaching material to another institution if an employee leaves, and this is covered in some policies by the right of the first institution to continue to use the material. Tighter protection for the institution is sometimes in place when an electronic teaching package produced internally is available commercially. Indeed, a UUK/HEFCE/e-university Working Group was established in 2001 to draw up best practice guidance to assist HEIs in establishing sensible and effective practices and procedures in handling IPR in e-Learning programmes, building upon the experience and expertise that already exists within the sector. Guidelines will shortly be made available to institutions as a result of this activity. These model contractual clauses for individuals and institutions for the development of e-learning materials might well form one model for handling more traditional scholarly communications and research outputs.

Some universities are beginning to handle copyright issues with their staff in a more proactive manner, providing guidance in the form of documents and in the form of a Copyright Officer, on the basis that both institution and individual can benefit from sensible copyright management. It is to be hoped that this positive approach will be used in future institutional copyright policies, and that copyright can be used to improve access rather than restrict access. Focus groups held with librarians as part of RSLG's activities have confirmed the negative consequences of academics giving away their copyright to commercial publishers and that a change of culture is desirable. The sector is keen to see a strong recommendation by RSLG on the future of scholarly communication, particularly the role of the mainstream commercial publishers.

Recommendation:

- **Consider the IPR model being adopted by UUK and the Funding Councils regarding sensible, effective practices and procedures in handling IPR in teaching materials, and establish a parallel set of model contractual clauses for the development of research materials.**

4.8 Preservation

A significant concern cited by authors, librarians, and readers is the uncertainty of long-term access to electronic publications. This uncertainty is multi-stranded and based partly on organisational and legislative issues.

Digital preservation requires new workflows, scarce skills, and close co-operation across different professions. New organisational structures to support this will take time to evolve. It is already clear that publishers are not committed, and cannot be expected to commit, to the long-term archiving of electronic publications that is necessary to support scholarly communications. The cost of preservation effort and the skills needed have also convinced institutions that there is an overwhelming need for such services to be provided centrally.

The fact that legislation has yet to be fully extended into the digital environment also contributes to the uncertainties and costs. As yet there is no statutory legal deposit for electronic publications published in the UK. There are also no archiving exemptions in our copyright laws for digital materials unlike their traditional equivalents. All digital preservation therefore involves rights clearance activities that are time-consuming, costly, or in some cases impossible. The legal deposit libraries are exploring voluntary legal deposit (primarily of offline material) with publishers and legislation for electronic legal deposit is anticipated. However legal deposit of electronic materials will not provide a solution to all archiving issues. Many publications from international publishers will not be covered by legislation and continuing access by institutions in line with licensing agreements would need to be resolved. Recommendations to RSLG related to digital preservation are discussed in more detail in 5.4.4.

4.9 Peer Review

The Association of Learning and Professional Society Publishers survey on peer review asked respondents to distinguish between their views as authors and their views as readers of electronic journals (ALPSP 2002). Whilst peer review remained important to over 80% of both authors and readers, when asked to predict what would be the most common form of quality control in five years' time, only a bare majority answered "traditional peer review" and 45% expected to see some changes in the peer review system within the next five years. Options for the future may include open peer review (where the author knows who the referee is), double-blind reviewing (where, at least in theory, the referee does not know who the author is), open peer review of pre-prints followed by revision and formal publication (in effect what happens in the physics community, owing to the existence of the e-print archive <http://arXiv.org/>), or combinations of the above.

Maintaining the quality of academic publication is essential, and shifting this process toward the consumer of scholarly communications – the reader – is desirable. A major objection to non-refereeing (or post-publication commentary) is that no-one has the time to read all the poor material to find the occasional good paper; referees save everyone else time by sorting the materials out into an order of descending quality. Models will need to be developed that are sensitive to inter-disciplinary differences.

It is difficult to disentangle the costs of a traditional peer review system from those of general administration of a scholarly journal, though it is easier to distinguish them from copy-editing costs. Research commissioned by SCG⁹ concluded that a cost of about \$200 per submitted paper, and thus \$400 per published paper if the rejection rate is 50%, is a good estimate that would cover the staff necessary to undertake the work on a journal (or stable of journals) too large to be run on an amateur basis. This figure includes the overheads necessary to provide the staff with office accommodation and the hardware and software necessary to run an e-mail-based manuscript submission, administration and communication system, and one to assist in the choice of referees.

Recommendations:

- **Pilot a number of new models in the UK, demonstrating sensitivity to the needs of different disciplines.**
- **Explore cost models for all phases of the scholarly communication process, and stimulate innovation in each phase.**

4.10 The Way Forward

There is a complicated supply chain lying behind scholarly publications, and rarely do academics understand their own roles/rights/responsibilities as authors, editors, peer reviewers, and institutional representatives. Institutional libraries have traditionally shouldered the financial burden of providing access to journals, but internationally are finding the current situation (in which the shift from print to electronic journals is causing even greater price increases) unsustainable. Resulting cancellations can affect academics, institutions, and research quality substantially.

While many publishers insist that journals as brands are important, the largest commercial scholarly publishers appear to be undermining the individual journal title by bundling titles together and offering libraries a service rather than a collection of products. This is an attempt to add value as an alternative to reducing prices. The value of the additional content received in a large bundle is unclear and bundling may even support weak titles that otherwise are not viable. While financial benefits may accrue, e.g. if inter-library loan requests reduce because library users have access to a much wider range of content than previously, there is, as yet, no evidence to demonstrate this. Furthermore, libraries incur costs associated with these large collections of titles that have not been individually selected. Many libraries catalogue all titles or create individual links from library web sites so titles that have not been specifically selected add costs that may not be justified. Another problem with bundled deals is that the licences often prohibit cancellation. Libraries that accept such a condition undermine the potential of initiatives like SPARC and ELSS that aim to create low-cost alternatives to expensive journals. If cancellation is prohibited, the library cannot support these initiatives by replacing the expensive titles with the low-cost alternatives. They remain obliged to subscribe to the former (Frazier 2001).

⁹ Rowland J.F. The Peer Review Process: A Report to the JISC Scholarly Communications Group, May 2002

The primary stakeholders in scholarly publication are authors and readers. To a significant degree, these are drawn from the same community. Neither group is routinely aware of the system-wide economic structure of scholarly publishing. Many researchers as authors support an economic structure that effectively deprives them, as readers, of access to all of the research papers that they need. Furthermore, as authors, they fuel publication of a volume of content that, as readers, they have difficulty managing (Meadows 1998). Authors represent the most significant source of demand for publications. Attempts to address this system-wide problem must include authors. Institutional commitment to fulfil the functions of 'effective' scholarly publishing is also required. Publication that may depend on goodwill and the voluntary contributions of individuals does not instil confidence in authors (Gomes and Meadows 1998, Kling and McKim 1999).

Recommendations:

- **Stimulate informed debate about an achievable national strategy to rectify the scholarly communication crisis.**
- **Provide visionary leadership for the future creation and management of scholarly content. The SCG warmly welcomes the idea of a National Electronic Research Library, especially if informed and scoped through the expertise already built in the community and integrated with other national initiatives that support e-science or lifelong learning.**
- **Explore cost models for all phases of the scholarly communication process, and stimulate innovation in each phase. Key aspects of this include:**
 - **Reassess all stages and players in the scholarly communication process.**
 - **Scope new social and technical systems for facilitating an author, or authors', registration of new scholarly output.**
 - **Ensure the continued high quality of UK scholarly output by developing new, discipline-specific models for certifying scholarly communications.**
 - **Consider ways to incentivise scholars and institutions to change their scholarly communication practices.**
 - **At present the "author pays" model seems to have promise. At least one innovative business model is being tested which allows unlimited free access for users, with the cost of editorial work and peer-review being met through a charge to the author, the author's funding body, or the author's institution. This business model is being used by BioMed Central (<http://www.biomedcentral.com>) and for one new title published by the Institute of Physics Publishing under the SPARC umbrella. It remains to be seen, however, whether this is a sustainable business model and the search for alternatives is definitely worth supporting, especially given the diversity across disciplines.**

5. Trends in Access to Scholarly Communications

5.1 User Behaviour

5.1.1 *Shift from Print to Electronic*

Virtually all journal publications used by UK scholars are now produced in an electronic format. Most are now sold or licensed in an electronic format, often in parallel to a print edition. All UK universities have the technical infrastructure in place to enable their staff and students to use the electronic resources available to them. This is the result of systematic national investment in fostering the uptake of e-journals through the Pilot Site Licensing Initiative (PSLI) and the National Site Licensing Initiative (NESLI). The total picture is very difficult to see in the short term, but all the indications are that use of journals in electronic format is increasing rapidly. There is no evidence that use of print journals is declining, although that may be happening.

5.1.2 *Impact on Scholars*

A report commissioned by SCG¹⁰ highlighted a range of impacts on scholars of recent changes in scholarly communication practices.

Preprint usage is high and there is a substantial growth rate in citations for articles contained within e-print archives. This indicates acceptance of the content by the scholarly community. Editors and publishers accept manuscripts previously deposited in e-print repositories, and the inclusion of preprints in some abstract and indexing services further reinforces their popularity.

Informal communication e-mail and the capability to send attachments have superseded photocopying and the exchange of documents by hand. The 'democratisation' of informal scholarly communication was also mentioned; new and established scholars are equally able, through e-mail and discussion lists, to participate in exchanges in virtual invisible colleges. Such avenues tended to be more exclusive in the past.

The changing picture of scholarly communication is also characterised by the increasing volume of material available and the enhanced access to this material. For example, academics and researchers can access information "to a different kind of discourse, at a different level" than ever before. This has facilitated the widening of audiences and interdisciplinary research. Indeed, it was voiced that "*the ability to find out for yourself has put a lot of power back into the hands of the scholar*". Significantly, some saw the role of the information intermediary as becoming less significant.

It is interesting to note that the majority of respondents seemed to regard the changing picture in learned communication in a relatively positive light, but this optimism was not unanimous. One respondent referred to the situation as "*turmoil – there are so many things changing at once*", although conversely, one publisher asserted that, "*There is less of a crisis in scholarly communication overall (except for the overload of material), than in scholarly publishing, which has many problems*".

5.1.3 *Impact of Multimedia*

Many changes in technology are occurring, and can be expected to enable major changes in scholars' publication behaviour. Key amongst these are desktop-based applications to facilitate the use of multimedia resources including images and video, and significant international investment in distributed computing grids.

Scientific discourse began as a verbal exchange between scholar and students, but with the invention of the printing press in the 1450's quickly moved to become text-based. Text has been the significant mode of scholarly communication for centuries, a robust economic framework to sustain this mode of discourse has developed, and there are significant cultural barriers to movements to change its hegemony. Text is an adaptable support to scholarly communication, as evidenced by the significant changes underway as we manage the shift from delivery on paper to delivery on digital media.

¹⁰ LISU Report to JISC Scholarly Communications Group: Trends in Scholarly Communication: Output, Access and Use Issues, May 2002.

The widespread availability of computers is however giving a new lease on life to verbal and visual modes of scholarly communication. Video streamed over networks can allow scientists to debate issues face-to-face, and could serve as powerful forms of communicating scholarly findings to both specialists and the public. The old adage that an image is worth 1000 words is not lost, as the economic creation and delivery of colour graphs and pictures is also facilitated by recent advances in computing technology.

Serious management challenges are implicit, notably: convincing scholars that it is worth their while to grasp opportunities presented by new media, changing assessment exercises to provide incentives for non-text-based discourse, institutional support for desktop equipment / training / support services, developing the SuperJANET network to support the streaming of video, creation of and maintenance for a critical mass of high-quality multimedia resources, and agreed protocols for managing resulting IPR. Significant benefits for the quality of teaching would also be likely. The ability for humanities scholars to manipulate images and text simultaneously is raising exciting new opportunities and serious management challenges.

5.1.4 *Impact of Grid Technologies*

The Global Grid Forum (GGF) is an academic-community-initiated forum of individual scholars and practitioners working on distributed computing, or "grid" technologies. GGF is the result of a merger of the Grid Forum, the eGrid European Grid Forum, and the Grid community in Asia-Pacific. In the UK work on the Grid is being led by the Research Councils and the JISC.

The likely impact on scholars of the Grid is that they will be able to become involved in distributed international data collection, analysis, and visualisation exercise based on easy manipulation of vast quantities of data. Shared authoring tools will mean that a much larger percentage of their intellectual output will be computerised, and that increasingly primary data will not exist in a way that can be printed. The Grid will support large-scale data across all disciplines, including social science and arts and humanities. Work needs to be undertaken to integrate Grid Technologies and library management systems.

Recommendations:

- **Focused national initiatives to stimulate production and use of new types of electronic resources are invaluable for building capacity and quality in the UK scholarly community. Major initiatives focused on electronic books, geospatial resources, images, learning materials for research students, and time-based media are needed.**
- **Develop methods for understanding end-user behaviour and requirements.**
- **Development of appropriate online tools and resources depends on this knowledge, and robust methodologies do not yet exist. Longitudinal monitoring to document and predict change is essential.**
- **Endorse the need for the UK must to be well-positioned to exercise influence in a variety of the Grid research areas including applications, application environments and architectures, security, content, scheduling and resource management, and performance.**

5.2 **Barriers to Further Growth**

Given that the availability and use of electronic publications is increasing, that 24x7 access to resources is possible, and that the research community is invigorated by GRID developments and scholarly communication initiatives, what are the barriers to further growth?

5.2.1 *Uncertainties about Archiving*

Uncertainties about archiving and long-term preservation of electronic journals are hindering the transition from print to electronic. The uncertainties are partly technical - "will the electronic format be readable in 20 years' time?" - and partly organizational - "who will take responsibility for long-term preservation?" UK bodies such as the British Library and JISC are already collaboratively funding some work to find answers to these questions. The outcomes from the CEDARS Project, and the on-going work on legal deposit, may provide the reassurance libraries need to have confidence in the

long-term accessibility of electronic publications. This is essential if they are to be empowered to abandon paper journal subscriptions, and thus the costs associated with supporting parallel publication in both electronic and print formats.

The problems appear to be the provision of visionary leadership, and funding so that satisfactory technical and organizational infrastructure can be in place to ensure long-term preservation and access. Unless the transition from print to electronic is to be delayed, libraries will otherwise have to make an act of faith and cancel print on trust that long-term access will be available.

Although publishers must be involved in this question, the willingness to take the risk in abandoning print is essentially a matter for the HE community to consider. Reassurance could perhaps be provided through a back-up arrangement administered by CURL and the BL, so that if all except a handful of libraries abandoned print there would be an assurance that easy access would be provided to remaining print copies if the electronic archive failed.

5.2.2 Uncertainties about the Future Roles of Information Suppliers

A combination of technical developments and the adoption of new pricing models may change the role of all intermediaries in the information chain. Uncertainties about future roles may be delaying the transition from print to electronic while existing suppliers protect their position. This uncertainty factor may be illustrated by the attitude towards usage statistics. While all intermediaries welcome the development of reliable usage statistics, they are divided on the way in which such statistics should be used. Librarians tend to see usage statistics as a way of coping with budget cuts, by targeting expenditure in areas of high use, while publishers see usage statistics as a way of increasing income, pointing to the heavy use made of electronic journals. It is difficult to foresee the adoption of a pricing model based upon usage until such aspirations are reconciled.

5.2.3 Frustration with Current Paradigms for Access to Online Information

Facilitating access to online resources is currently an extremely time-consuming and frustrating business. This is for a variety of reasons including:

- Potential users of information are required to interact with many different web-based services, each with its own interface and query style. Most are so bewildered by the myriad options available to them that they opt out and rely almost exclusively on general web search engines¹¹. This means that they are unlikely to access the majority of peer-reviewed and quality assured scientific literature, and that they waste a great deal of time filtering out useless web sites.
- The managerial tasks facing librarians and other information professionals in UK universities is extremely complex and time consuming. In addition to the significant staff time required to evaluate all the potential agreements for online information, effort is needed to licence, accession, catalogue, and sign-posting resources to the community¹².

Managing access to electronic resources is so time-consuming that it in fact overshadows attempts to evaluate how users are actually using electronic information. An example comes from evaluation of NESLI referred to earlier. The evaluation report, despite the best efforts of the consultants who prepared it, did not scratch beneath management issues to reach end-user behaviours.

A barrier in the transition from print to electronic would be removed if publishers facilitated easier routes for users to access electronic content. Publishers have also restricted access to current content through intermediaries, and their copyright policies have hindered the deposit of journal articles on academic servers. Their motive is clearly to protect their revenue by retaining control of the access routes. The task of the academic community should be to encourage open access, with multiple routes available for users to electronic content.

¹¹ JISC Monitoring and Evaluation Framework results.

¹² JISC Monitoring and Evaluation Framework results.

5.3 The Information Environment

The JISC's vision for a distributed national electronic resource is deceptively simple: provide access to required resources by whomever, whenever, wherever. The basic idea is to utilise and further develop cutting edge technology to give individuals joined-up access to what they require. This vision is powerful, and frames work in the UK and internationally to develop some exciting solutions. These include:

- Creation of a common information environment to help users quickly and easily discover all relevant information. Though initially scoped based on the needs of the UKHE sector, the architecture for this environment is receiving attention across sectors in the UK (e.g. culture, health, public libraries) and internationally.
- Recommendations for a single national communication and marketing framework for all resources held within this common information environment.

Worldwide we are beginning to see innovative projects to develop new access tools and regimes for scholarly resources. Significantly, many of these international initiatives were stimulated by the JISC's electronic libraries (eLib) programme, and are being informed by the UK's evolution from a vision for electronic libraries to its vision for a common information environment.

The UK funding councils, through the JISC, are currently investing £18,000,000 over 3 years to pump-prime development of the common information environment. (This is in addition to the £36,000,000 over 3 years to be spent on content licensing and service delivery costs.) How will the sector benefit from this investment in pump-priming the information environment?

An essential focus for information environment development is to facilitate changes in scholarly communication by building the capacity to self-publish. Strategies and tools to support the creation of electronic content, repositories in which to deposit and share this content, and increased understanding of the associated management challenges and costs will emerge. The culture change that might be facilitated through these developments cannot be over-emphasised. Rich research collections contained within our libraries, museums and archives will be unlocked for scholars. Scholars own resources will be sharable in new ways, potentially supported by a different range of intermediaries working with quite innovative business models.

Current projects underway will:

- enable institutions to disclose and/or deposit content resources for sharing (e.g. e-prints, institutional records, theses, etc);
- analyse the technical, organisational and cultural challenges of these processes;
- define the costs involved in all stages of content creation and management;
- scope a *Serials Union Catalogue* for the UK;
- build national support services to assist institutions in making their resources more widely accessible;
- explore use of the OAI harvesting protocol with non-textual content and to facilitate digital preservation, authentication, e-content management, and reference linking between texts;
- provide online access to abstract and index information for UK theses and the electronic submission of theses through the NDLTD software;
- create tools to assist scholars in discovering, accessing, and using an expanded variety of research resources;

These projects are numerous and complex, but the key strategic deliverables from information environment development activities will be:

1. Increased community control over some of its intellectual property.
2. Development of new exemplars and models to facilitate scholarly communications
3. Build capacity for management of the publication process by UK universities and scholars;
4. Experience in managing access to a wide range of electronic content important to UK scholars.

5.4 New Technologies to Support Scholarly Communications

The five stages of scholarly communications defined in section 3 (i.e. registration, certification, awareness, preservation, and reward) might all be supported better if investment were made in developing appropriate tools.

5.4.1 Registration

Reliance by both the private and public sectors has driven a requirement for provision of methods by which transactions can be made secure, and whereby the identities of communicators and the precise time at which they communicated a particular message can be captured and verified. The technology underpinning these developments is known as public key infrastructure or PKI. This technology holds substantial promise for registering claims to the first publication of important research results among the scholarly community.

5.4.2 Certification

There has been a recent explosion of software packages designed to manage the peer review process. It is desirable to explore the applicability of this software to the requirements of different disciplines and institutions in the UK, develop open source versions of the most useful, and facilitate wide deployment in the UK. As innovative alternatives to traditional peer review emerge, new tools will be required.

5.4.3 Awareness

Robust repositories for storing scholarly communications, or at least descriptive catalogue records about them, are required. These repositories will need to be linked to distributed collections of primary and secondary scholarly resources, and will need to be presented and promoted to potential users in subject-appropriate ways. Tools for facilitating awareness are currently being scoped by the JISC and its international partners through a variety of broker, portal, and middleware projects. This development investment will result in models and proto-types, but deployment of full-scale services will require considerable investment.

5.4.4 Preservation

A significant concern cited by authors, librarians, and readers is the uncertainty of long-term access to electronic publications. This uncertainty is multi-stranded and based partly on content and legal issues (discussed in section 4.8) and partly on technical issues.

Technical uncertainties arise from the fact that users can only access electronic information by means of hardware and software. Rapid changes in the technology and standards mean that traditional methods of preservation -- largely passive and based on careful handling of the communication medium -- are no longer appropriate. Digital preservation is a relatively new area and the techniques and standards needed are gradually emerging from current research, but there is much still to do.

Operational implementations have been constrained by the absence of additional funding for new long-term commitments and the uncertainty over both technical issues and cost models. With the notable exception of data centres that support some areas of primary research (e.g. the social sciences), there is no long-term funding for preservation activity. Funding has been provided only for short-term research. Organisational uncertainties are fundamental: who should be responsible for digital preservation activities? The distribution model has changed and libraries frequently no longer hold electronic journals but licence access to them via the publishers' remote servers. Journals may be purchased through consortia. As publishers and libraries experiment with business models the licence terms are in constant flux, so no potential player understands all of their rights and responsibilities.

The Digital Preservation Coalition was also launched in the UK in July 2001 and copyright libraries and publishers together with JISC are involved in its activities. The Coalition has been highly successful with membership now rising to 19 organisations. It is achieving substantial benefits to the sector through leveraging action from and partnerships with other national organisations. Potentially it can

play a key national role in co-ordinating activity and resolving roles and responsibilities. Publishers are becoming more aware of the issues and are increasingly involved in collaborations to explore potential solutions for long-term archiving.

Preservation of digital resources will be of increasing importance for a wide range of scholars within UK HE. The sector invests substantial sums in subscriptions to e-journals and is investing heavily in digitisation and in arts and scientific data in digital form. As the momentum for collaborative research and e-science continues to grow there will be significant implications for securing the future of primary research data. The sector is also a major user of and heavily dependent on, digital resources created or curated by other sectors including government and the national libraries and archives. Unless significant effort is urgently put into digital preservation and securing long-term access to these digital resources, uncertainties over archiving will continue to impede the growth of scholarly electronic publishing. Secondly current investment in digitisation and digital content will also only secure short-term rather than lasting benefits.

Since its inception in the early 1990s, the World Wide Web has become a pervasive means of communication for all kinds of information resources. Although much of the Web may be ephemeral and subject to rapid change, its unique character and potential research value is increasingly recognised. In recognition of these changes and challenges, a number of Web archiving projects have begun to emerge. These include:

- "special collections" such as the September 11 archive or the Clinton Archive of the White House Web site;
- the Internet Archive which attempts to capture the entire publicly accessible Web. It contains over 100 terabytes of data and is growing at the rate of 12 terabytes a month. Users can type in an URL, select a date, and then begin surfing an archived version of the Web from 1996 onwards;
- the Kulturwa project which is archiving all web pages in Sweden;
- the Pandora Archive which preserves a selection of Australia's online cultural heritage.

The selective archiving of online documents has also occurred on a limited pilot basis in the UK. The JISC and Wellcome Trust are currently undertaking a feasibility study of web-archiving, and the BL are closely involved with the advisory group for this.

Recommendations:

- **Ensure perpetual access to digital records, through a national strategy for digital preservation. Although some technical issues remain to be solved, many challenges relate to developing national policy frameworks. For digital preservation there is a need to clarify what should be legally deposited, articulate why scholars need such resources to be legally deposited, champion scholar's interests as legislation is introduced in the next session of parliament to govern electronic legal deposit, analyse whether there should be one or more central digital preservation repositories to ensure security through replication, and put in place national arrangements to secure long-term digital preservation in the UK.**
- **Direct sponsorship of the Digital Preservation Coalition to help it deliver this national strategy on an accelerated timescale is recommended.**
- **A major collaborative partnership to establish a web archive in the UK and to form a core component of the national virtual electronic library collection.**

5.4.5 Reward

Explicit rewards for participating in innovative scholarly communication activities may be unnecessary in the short term, as parts of the research community are very enthusiastic about ensuring change. In the long run, as challenges and costs become clearer to both scholars and their institutions, greater attention to incentives will be essential. Technology cannot scope or solve this issue, but can be used to track and manage rights that have accrued through the creation of new intellectual property. Development and deployment of appropriate rights management software and systems will be increasingly important.

Recommendations:

- **Define where costs and responsibilities lie at all stages of the current scholarly communication process. Invest in defining desired changes in costs and responsibilities at all stages of future scholarly communication processes.**
- **Embed the technology and standards of the common information environment in the National Electronic Research Library. Stimulate continued investment in innovative technologies to support future scholarly communication practices.**

5.5 E-Books

E-book publishers are not wedded to any particular technology at the current time. The advantage of this is that they are flexible and open-minded about user requirements. The disadvantage is their need to create books in multiple formats for the current e-book marketplace as this tends to raise costs.

5.5.1 Access

Today e-books can be read with a variety of devices, including handheld readers (mainly used for diaries, note-taking and email), dedicated e-book readers, a computer, or laptop. Not all devices are suitable for all users. Some offer black and white screens only, others offer colour; some can support images and technical material. There are varying screen sizes, different weights and memory/storage capacities. Prices vary enormously, according to the sophistication of the technology, from the mass-market Franklin eBookman (at \$129) upwards. Different readers use different technical standards, something the Open E-book Project is trying to address. Most of the e-book readers and more generic hand-held devices only offer small selections of e-books in a proprietary format. In the US, a growing number of libraries provide e-book readers to users.

Many publishers and aggregators have said that they expect the hand-held device market to develop, however they express doubts about the existing technology and highlight the need for the quality of the reading experience to improve. The market seems to indicate the need for a multi-purpose device and improved screen technology.

Screen technology will have to display 200-300 pixels per inch before screen quality matches paper. Current e-book devices are only just over 100 pixels per inch. Both Adobe and Microsoft have been working to produce a more comfortable reading experience by producing software that smoothes out the jagged edges of characters and makes text appear sharper.

5.5.2 Standards

A number of surveys of e-book standards and formats are available in the public domain. While the Open E-book Standard (OEB) provides a specification for the content of e-books, Electronic Book Exchange System (EBX) focuses on rights management. Representatives of the Open eBook Forum and the Electronic Book Exchange Working Group have developed a plan to combine the efforts of both organisations. Gaps currently exist in standards for e-book numbering systems, descriptive metadata, and digital rights management.

5.5.3 E-Books in the Information Environment

The JISC's E-Books Working Group has already established relationships with relevant bodies involved in the development of e-book standards. These include BIC (Book Industry communication), the Publishers' Association, UKOLN and MEG (Metadata for Education Group). The Information Environment architecture will support a variety of means of access to the material. Authentication and digital rights management systems should be able to distinguish at institutional and/or user level between the subscription, pay-per-view and other models likely to be adopted for e-books. The JISC may consider working with partners involved in applying new technologies. The aggregators of reference works, Xrefer, have expressed interest in working with higher education to apply their cross-referencing and linking technology to older reference material.

5.5.4 *Electronic Theses*

The availability of academic dissertations and theses in electronic formats is now commonplace in the developed world – except in the UK. Access to UK doctoral theses is very restricted, relying upon application to a library to read a closed-access copy or a delay for a microfilm to be made and sent to the user. These poor arrangements contrast dramatically with the immediate access possible to theses from universities in many other countries. A large number of universities in different countries have implemented systems for the electronic submission of university theses.

The most advanced arrangement for the electronic submission of theses is the Networked Digital Library of Theses and Dissertations in the United States. This organization - set up with US Government and other grants - has 120 universities world-wide in membership and Virginia Tech alone already has the full-text of 2000 theses available on the WWW (<http://www.ndltd.org/> and [http://www.theses.org/.](http://www.theses.org/))

The recent launch of two national e-theses projects by the JISC might appear straight-forward, but significant barriers had to be overcome to gain community support for a single vision of the way forward. An insight is provided into these barriers in order to inform RSLG planning for its National Electronic Research Library.

Within the library community, interest in electronic theses has been led by the UK University Theses Online Group (UTOG). This is an informal group of information staff from 12 universities and the British Library. UTOG was formed seven years ago, and began by considering the scanning of paper theses into electronic format in order to improve access to theses and to save space on library shelves. The most significant process within the UK has been made by Edinburgh University Library in a project funded by UTOG. The primary focus of the project was to scan theses already submitted in paper format, and since March 2001 24 theses have been scanned. The project team has also converted the text of 6 'born digital' theses into standardised formats.

In parallel with the project at Edinburgh, the JISC funded a project in collaboration with the publishers of the *Index to Theses* on the electronic submission of author, title and abstract information. An operational system was designed, informed by both registry staff and authors from several universities. A result of this project is that a mechanism is now in place that can be used more widely for the processing of the full-text of theses as well as the author/title/abstract information. The system follows the progress of the text from author through administrative and examining procedures and this workflow is monitored by the system, with prompts for action at various key points.

This work has demonstrated that there are some administrative and technical problems to solve in the electronic submission of theses. It has, however, highlighted the fact that the key barrier is a cultural one: paper submission of theses is deeply embedded in the culture of UK universities. It is clear that efficient access to UK theses depends upon the use of electronic submission procedures. The goal must be to encourage and to support all UK universities in making that shift towards electronic submission, so that research staff and students may have faster and easier access to the new research contained in doctoral theses.

The e-thesis development can also bring wider benefits in scholarly communication, as graduate students become familiar with the opportunities provided by electronic publication and the issues such as copyright that they have to address in submitting an e-thesis. A change in the format of theses could feed through into changes in other forms of scholarly publication. The point at which scholars learn scholarly communication practices is the point at which alternative behaviours might best be inculcated. For example, when Virginia Tech imposed mandatory submission of theses and dissertations in electronic form, they used that opportunity to teach postgraduate students about the scholarly communication system and to equip them with the skills to create scholarly documents in standardised, electronic form (Fox 1999). Initiatives directed at postgraduate students have the potential routinely to inform a new generation of scholars about the scholarly communication system, the assignment of copyright and related issues and to train them in the production and self-publication of electronic scholarly documents as they learn scholarly communication practices.

5.6 E-Journals

A number of e-journal archiving pilot studies have received funding from the Mellon Foundation, and these projects are exploring a number of potential business models with publishers. The UK should learn from these projects, but may also need to invest in parallel exploration as the UK context is somewhat different. The JISC has recently commissioned a 12-month consultancy to evaluate previous licences; explore with publishers and other stakeholders archiving and access provisions; and evaluate future options for archiving of licensed e-journals and access arrangements. This is not an area in which the UK HE/FE community is the sole player and collaboration with other partners particularly the national libraries and publishers is essential. A key part of the consultancy will be to scope opportunities for sharing development risks and costs with other funders.

5.7 Metrics of Use

More robust metrics for evaluating the use of electronic resources, and the impact this use has on end users and their scholarship are required. The JISC has invested in the creation of an innovative Monitoring and Evaluation Framework¹³ for the use of electronic resources, and is also working with the publisher community to develop the first-ever international code of practice for collecting and reporting e-journal usage statistics. RSLG endorsement of these activities, deployment of the frameworks, and continued investment in longitudinal monitoring of user needs and behaviours is essential.

5.8 Marketing

In order to capture the hearts and minds of users, marketing of access points to scholarly information must transcend the organisations that collaborate to provide the range of required scholarly resources. Essentially by promoting an endless series of new portals, virtual library services, etc. to the same community of academic users publicly-funded bodies are competing with one another, with publishers, with free web search engines, and with other commercial players. Public bodies acting individually are less likely to succeed in attracting scholars, but acting in concert are most likely to influence and improve user experiences. The idea here is for public-sector bodies to work collaboratively to create appropriate research portals

Recommendation:

- **Marketing is an essential issue in scoping the NERL. Rather than advocating badging of the NERL by the BL and the HE funding councils alone, the creation of a portal is recommended, carrying the branding of a wide-range of organisations that hold serious weight with scholars (e.g. funding bodies, research councils, professional societies, institutions). This portal should be compatible with other portals in the common information environment.**

¹³ See http://www.jisc.ac.uk/pub00/m&e_rep1.html.

6. Conclusion

The Scholarly Communications Group has looked broadly at scholarly communications as social processes fundamental to the core function of higher education. The background work undertaken and commissioned by the Group indicates that the range of resources required by scholars is expanding rapidly. The emergence of an e-science community will empower scholars to articulate their changing needs and draws attention to the need to re-assess every stage of scholarly communications, with great sensitivity to disciplinary differences.

There is considerable agreement across the world of scholarly communications on the opportunities and difficulties in the changes underway. The key issue is recognised to be the way in which access to academic information is restricted by the present scholarly publishing structure. SCG considers that a step-change in the current scholarly communications system is needed to lead to a future in which:

- scholars produce intellectual output that is first SHARED with other educational institutions and THEN, if appropriate, passed on to the commercial sector in a controlled way for further exploitation. This would radically alter the current economic cycle of content provision (which costs UK HE hundreds of millions of pounds per year), and would need to be handled sensitively so as not to destabilise the marketplace too much or bring about the extinction of smaller publishers.
- content is recognised as core research infrastructure and should be equally available to all scholars regardless of where they are or what institution they are affiliated with. Innovative, high-quality, internationally-respected research cannot take place unless researchers have access to all the relevant literature.
- researchers are valued as knowledge creators who contribute actively to the economic and other successes of the UK. The current scholarly communication system reduces many scholars to donors and consumers of knowledge that is managed and owned by others.
- scholars can access all relevant resources and tools they need, including those to facilitate self-publishing, from anywhere anytime in a way that is as easy as is possible.

SCG believes that there are a number of key challenges facing the UK in achieving a dramatic change. The UK and its universities need to build capacity and undertake transformative change in the way research is communicated. Capital funding will be essential to facilitate this. There is a need for successful alternative publishing modes that fulfil key requirements such as quality control and robustness through version control. There is also a need for attitudinal and behavioural changes. This will be a generational change even if many scholars are already exploiting some opportunities available to them.

Institutional behavioural change associated with new publishing modes to do with copyright and in management and charging models within institutions is also required. New developments for managing content, tools for access, costs for cataloguing, and preservation are shifting the balance of costs around institutions but this is not yet fully understood and presents significant management challenges within institutions.

Uncertainties about new pricing models are hindering the transition from print to electronic. Most publishers appear willing to experiment with new pricing models but wish to protect their existing income through a range of mechanisms. A significant concern also cited by authors, librarians, and readers is the uncertainty of long-term access to electronic publications. This uncertainty is multi-stranded.

SCG therefore believes that there are a number of key challenges and areas where specific strategic interventions will help to accelerate the pace of change and facilitate the development of national policy frameworks. SCG welcomes the idea of a National Electronic Research Library bringing new opportunities to expand and grow the resources available to users, building on the existing electronic content activities supported by the HE Funding Bodies. SCG strongly recommends that such an initiative is informed and scoped through the expertise already built in the community and integrated with other national activities that support e-science or lifelong learning.

Appendix 1

JISC Scholarly Communications Group

Mission Statement

To make a leading contribution to the investigation and implementation of sustainable and cost-effective emerging behaviours across the various aspects of the scholarly communications process, on behalf of the UK educational and research communities, and in collaboration with relevant national and international partners.

Terms of Reference

- To consider the issues related to the existing scholarly communications process, including peer-review and other editorial aspects, costs of journals, increasing numbers of new journals, the transition from print to electronic publication, IPR, e-prints, end-user access arrangements, and long-term preservation;
- To identify the desirable characteristics of an ideal scholarly communications system, addressing both the deficiencies of the existing system and optimising the opportunities that the digital age enables;
- To explore new mechanisms, concepts and economic models for scholarly communication based on those characteristics;
- To identify practical pilot work that could be commissioned to demonstrate the viability and incrementality of proposed solutions;
- To consider how the Research Assessment Exercise can support and be responsive to emerging behaviours in scholarly communication;
- To consult with relevant stakeholders about emerging behaviours and, in particular, to raise awareness amongst editors, authors and end-users of current issues in scholarly communication and the advantages that new models would bring;
- To bring active leadership in national and international collaborations related to scholarly communication issues;
- To report and make recommendations to the Funding Bodies, JISC and its committees and other appropriate organisations.

SCG Membership

Dr Reg Carr (University of Oxford) (Chair)
Lynne Brindley (British Library)
Dr Tony Bruce (Universities UK)
Dr Ken Edwards (Conference of European Rectors)
Allan Foster (Keele University)
Fred Friend (UCL)
Dr Tom Graham (University of Newcastle)
Andrew Green, (Librarian, National Library of Wales)
Keith Jeffrey (Rutherford Appleton Laboratory)
Clare Jenkins (Imperial College)
Professor Arthur Lucas (KCL)
Professor Charles Oppenheim (Loughborough University)
John Rogers (HEFCE RAE Manager)
Professor Peter Scott (Kingston University)
Dr Alicia Wise (DNER Assistant Director)

Appendix 2

RSLG VISION

Our core concern is how to ensure that researchers working in the UK can have access to the full range of world-class information resources. This entails a focus on delivery: ensuring that individual researchers can have easy access to the information that they need wherever this may be located. The twin pressures of rising costs and volume of materials have already brought us to the point where no library can realistically aim to collect and hold all of the materials that its users require. We believe that within (and beyond) our planning horizon most researchers will be working with the *hybrid library*, employing technology as an aid to access and to information handling wherever appropriate. By "the hybrid library" we mean a mixture of materials in hard copy and electronic form, drawn from a variety of sources and locations - with the range and nature of the mix varying for researchers in different subject areas and research environments. Researchers will increasingly be able to obtain much of what they want directly from the desktop. Technology is already widening access to rare and historic materials in "heritage" collections, and to the major research collections of the world, as well as supporting a new generation of online datasets. Nonetheless, for many researchers the possibility of physical access to particular bodies of material will continue to be important even if this may also be read online. We need to identify strategies for making better use of existing resources to bring this about. Librarian and libraries will continue to play a critical role in meeting researchers' information needs - though they will also face the challenge to evolve in response to changing demands. We see an increasing emphasis on collaboration between information providers, each playing a distinctive part within a more actively planned and co-ordinated national (or even international) system and structure. The challenge in implementing our vision will be to harness the energy and commitment which institutions and librarians currently devote to meeting the needs of their own distinct user groups in support of the distributed national hybrid library meeting the needs of all UK researchers.

Scholarly Publishing: Remit to JISC Group

Having regard to the terms of RSLG's remit, to advise the Group on:

1. Trends in scholarly publishing observable now and how these will affect patterns of publication, and researchers' use of publications, in the future. This should include
 - a. Trends in volume and preferred format of published output (e.g. are journals becoming more numerous and diverse? What is the medium term outlook for the monograph?)
 - b. The pace and focus of the switch to electronic publishing, including both "traditional" outputs in electronic form (e.g. conventional journals going online) and the development of new formats specifically exploiting the electronic medium (preprints; text outputs linked to datasets that are only available online; others?)
 - c. The case (if any) for pro-actively encouraging any particular actual or possible development (are there potential developments which might if encouraged lead to significant change in the research process or in the cost of accessing information sources?)
2. Implications of the observed trends, including:
 - a. The implications of a shift from print to electronic publishing:
 - peer review processes, copyright and ownership of material
 - the significance of journal titles as indicators of quality and peer esteem
 - the effects of change on learned societies whose journal is their main income source
 - the dynamics of commercial journal publishing
 - b. The implications for researchers' publication behaviour more broadly: are changes likely in the preferred mode and format of publication and in perceived hierarchies of publication type?
 - c. Managing access to online material – including licensing, cataloguing, and search engines.
 - d. The implications for the presentation and submission requirements of theses and for access to these.