Electronic Journals: A Literature Review 1995-1999

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Questo lavoro e' stato condotto all'inizio del 2000 nell'ambito delle attivita' per il conseguimento del "Master of Arts in Information Studies" presso la University of Northumbria di Newcastle (School of Information Studies). La letteratura di riferimento copre prevalentemente i cinque anni precedenti (1995-1999) con attenzione al contesto europeo (in particolare il Regno Unito) e agli Stati Uniti. La bibliografia e gli indirizzi dei siti web sono stati aggiornati nell' ottobre 2002.

Contents

1. Introduction

Electronic journals have been available on a small scale for several years. Mainstream publishers are now beginning to embrace the Internet, particularly the World Wide Web (WWW) technology, as a ubiquitous way to offer their publications to the international community.
This literature review attempts to survey a number of issues facing electronic journals, to discuss current problems and solutions being undertaken or considered, and to highlight areas worthy of further investigation. In itself it is a large topic and it would be impossible to cover all the areas thoroughly. It is divided into ten sections including the main issues of the current debate:

- Defining Electronic Journal
- General Issues
- Selection Criteria
- Access
- Pricing Models
- Cataloguing and Metadata
- Archiving
- Copyright and Licence Agreements
- User Studies
- The Role of the Librarian

Most of these issues are vast, complex and interdependent. Because of the rate of innovation in this field, this review is limited to literature published mainly in the last five years (1995-1999). It gives attention to the European context, particularly the United Kingdom (UK), and to the USA.

2. Defining Electronic Journal

What is an electronic journal? There is no standard accepted definition of an electronic journal. Rustad states that "an electronic journal is a periodical – regular or irregular – and moderated unit made available in an electronic format, either on a static medium or via computer networks."1
Edwards defines the difference between electronic and online journals:

> " Electronic – one where the text is read on, and/or printed from, the end user's computer rather than as print on paper. Online – the data is downloaded directly from the host computer rather than via an intermediate medium such as
> CD-ROM."2

Definitions of an electronic journal also range from a journal with only the abstracts online to the full-featured, highly linked information resource. Boyce defines an electronic journal as "a *linked, permanent* information resource for *transferring* reliable and accurate information from the producer to the reader."3 The author considers these three important characteristics as the hallmark of a good electronic journal. Each defines the difference between the electronic journal regime and that of the paper journal.4
Edwards5 writes of a "continuum" of types and Nisonger gives a good review thereof:

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1 Rustad, K. Electronic Journals in the National Library, quoted in: Tomney, H. and Burton, P.F. Electronic Journals: A Study of Usage and Attitudes among Academics. *Journal of Information Science*, Vol. 24, No. 6, 1998, p. 420.
2 Edwards J. Electronic Journals: Problem or Panacea? *Ariadne*, No. 10, July 1997. [Online].
URL: http://www.ariadne.ac.uk/issue10/journals
3 Boyce, P.B. Scholarly Journals in the Electronic World. *Serials Librarian*, Vol. 36, No. 1/2, 1999, p. 189.
4 Ibid.
5 Edwards J. Op. cit.

> "Electronic journals may be: electronic only; an electronic only version of a former print journal; or simultaneously electronic and print. The term electronic journal has been applied to journals that are available: by CD-ROM, such as ADONIS; online, as for example, through DIALOG; or networked, such as the Internet or Bitnet. Electronic journals can be: free; paid subscription; pay per use; or licensed for access rights. Some can only be subscribed to as part of a multi-journal package. Some electronic journals organize articles into issues, while others release articles separately. They can be stored on a local library or campus computer, or accessed from a remote site."6

3. General Issues

Electronic journals present a whole range of new challenges as well as new opportunities for information providers and librarians in all aspects of their work. Although electronic journals are relatively new formats, Nisonger believes that "most traditional library functions are applicable to electronic journals: selection, policy making, collection evaluation, staff and user education, cataloging, budgeting, and archiving/preservation."7 Woodward8 and Smith9 both emphasise the new levels of complexity and diversity associated with library provision of electronic journals. Smith believes that "everything about electronic journals is more complex: acquiring them, obtaining a licence to use them, creating bibliographic records for them, providing access to them, holding on to them in perpetuity."10
The concept of libraries as comprehensive archives seems unlikely to continue as it has in the past. Tagler11 states that the library's philosophy is changing from collection building to information provision. This shift is evident in the print environment as many libraries abandon the notion of comprehensive collecting and try simply to meet users' demands. This changing mission becomes accelerated in the electronic world.

4. Selection Criteria

In the traditional library collection development process the criteria for selection of materials are by now well established. However it is crucial to evaluate currently used selection criteria to determine whether they are appropriate to electronic journal selection.

4.1 Identification

Current discussion focuses on the importance of which selection tools to use for identifying titles to acquire for the collection.
Woodward12 believes that electronic journals are more difficult to find out about, because those made freely available on the Internet have little or no marketing budget and rarely find their way into traditional bibliographic sources, and even titles emanating from commercial suppliers are notoriously difficult to locate. On the contrary Edwards believes that "identification of suitable titles is in some way easier in the electronic medium."13 Both these authors and Leathem14 state that the *Association of Research Libraries (ARL) Directory of Electronic Journals, Newsletters, and Academic Discussion Lists* (http://www.arl.org/scomm/edir/index.html) backed up by e-mail notification services like *Newjour: Electronic Journals and Newsletters* (http://gort.ucsd.edu/newjour) is one of the best and most

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6 Nisonger, T.E. Electronic Journal Collection Management Issues. *Collection Building*, Vol. 16, No. 2, 1997, p 58.
7 Ibid., p. 59.
8 Woodward, H. Electronic Journals – The Librarian's Viewpoint. *Serials*, Vol. 11, No. 3, November 1998, p. 232.
9 Smith, M. Hanging on to What We've Got: Economic and Management Issues in Providing Perpetual Access in an Electronic Environment. *Serials*, Vol. 11, No. 2, July 1998, p.140.
10 Ibid.
11 Tagler, J. The Electronic Archive: The Publisher's View. *Serials Librarian*, Vol. 34, No. 1/2, 1998, p. 226.
12 Woodward, H. Op. cit., p. 232.
13 Edwards J. Op. cit.
14 Leathem, C.A. Issues in Electronic Journals Selection and Management. *Internet Reference Services Quarterly*, Vol. 3, No. 3, 1998, p. 17.

comprehensive sources identifying electronic publications. Leathem15 argues that electronic journal metasites can also be used. *CICNet* (http://ejournals.cic.net/index.html), for example, lists alphabetically and by subject all those titles which are freely available on the Internet.16

4.2 Evaluation

There is a general agreement that evaluation criteria should follow the principles established for printed subscriptions. Edwards,17 Nisonger,18 Leathem19 and Woodward20 consider the usual selection criteria such as subject usefulness, quality/peer review, relevance to research, teaching and learning, status of publisher etc. Leathem21 believes that vendors, indexing services, and librarians need to evaluate the integrity and stability of electronic journals, considering the latter as a crucial factor, and each is reviewing current policies and developing a new access or collecting philosophy. Luther focuses on other issues concerning electronic journal evaluation such as accessibility and availability of a "formal published version which could be annotated with conversations monitored by an online editor."22 Duranceau *et al.* explain how the E-journal Subgroup, in examining the collection development policy for Massachusetts Institute of Technology (MIT) Libraries, recommended that:

> "MIT Libraries' short-term strategy be to point to all e-journals that have been selected for our collection by subject specialists, as long as they are available over the Internet at a stable, well-supported site that offers the complete run of the e-journal with a user-friendly interface."23

Nisonger suggests adding further criteria unique to the electronic format:

> "whether it is online, CD-ROM, or networked; whether it is ASCII, Postscript, HTML or some other data format; technical compatibility with your equipment; the amount of training required; the amount of maintenance required; licensing terms, the user interface; reliability of access; stability; and whether the journal is archived."24

He also25 criticises the literature for reporting little or nothing on "macro" evaluation (how electronic resources affect evaluation of the entire collection) and believes in the need for a standardised statistical method to facilitate valid comparisons among libraries and the need for developing new client-centred methods focusing on availability and accessibility rather than on ownership.

5. Access

Integrating electronic journals into the library collection raises issues for both librarians and publishers: technology requirements such as different electronic formats in which the journals are available, different Web applications required to view the articles, authentication methods used by the publisher to allow access, and making users aware of online access. Discussion also focuses on two separate access

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15 Ibid., p. 17-18.
16 The Committee on Institutional Cooperation (CIC) Electronic Journals Collection (EJC) was initiated as a pilot project for the cooperative management of electronic journals. After three years the CIC libraries were ready to implement local options for electronic journals access. Consequently, the EJC site as it existed ceased in May 2000.
17 Edwards, J. Op. cit.
18 Nisonger, T.E. Op. cit., p. 60.
19 Leathem, C.A. Op. cit., p. 18.
20 Woodward, H. Op. cit., p. 232.
21 Leathem, C.A. Op. cit., p. 18.
22 Luther, J. Making the Most of Electronic Journals-Library and Secondary Publisher Perspectives. *Serials Librarian*, Vol. 28, No. 3/4, 1996, p. 315.
23 Duranceau, E. *et al.* Electronic Journals in the MIT Libraries: Report of the 1995 E-Journal Subgroup. *Serials Review*, Vol. 22, No. 1, Spring 1996, p. 60.
24 Nisonger, T.E. Op. cit., p. 60.
25 Ibid., p. 61-62.

functions: the electronic access provided by the publisher and the local access provided by the library for its users.

5.1 Security

Machovec[26] asserts that a key element facing publishers is how to offer access to their electronic journals on the net while maintaining security for authorised subscribers and locking others out. The author, considering that full access to complete publication requires authentication, synthesizes the two most common methods of restricting access that include issuing a password to the subscriber or using domain limiting on the Internet.

> "In addition to IP filtering and server-based passwording models, many libraries and consortia are looking for additional options such as the ability for a Web-based script to query a patron file in a library circulation system or a campus registration system that would then allow authorized users access."[27]

Chadwell and Brownmiller, discussing benefits and difficulties of these solutions, maintain that "the use of individual IDs and passwords can help to reassure the publisher that each person accessing its service is aware of copyright and license restrictions."[28] Lynch[29] describes the two approaches that are now emerging to address the access management problem: the use of proxies and of electronic credentials.

5.2 Publishing Methods and Formats

Schoonbaert argues that publishers have several reasons to embrace cyberspace: "Electronic documents hardly occupy physical space, can be copied endlessly without quality loss and be distributed almost at once around the globe."[30]
Pullinger[31] suggests three possible models for the network publishing of journals: in the form of e-mail, through local networks and through a central host where users can browse and download relevant items. Day[32] believes that the latter seems to be the currently favoured model, largely because of the influence of the World Wide Web, and is used for network publication and commercial distribution of scholarly journals.
Electronic journals are available in a variety of formats and the literature takes cognisance of the complexity of this issue. Harter and Kim[33] provide a list of data formats.
Day,[34] De Robbio,[35] Luther,[36] Machovec[37] and Schoonbaert[38] discuss the formats used: the simplest and most common formats, American Standard Code for Information Interchange (ASCII) and bitmaps, the popular PostScript and its more flexible relation, Adobe's Portable Document Format (PDF), the HyperText Markup Language (HTML) and its parent Standard Generalised Markup Language (SGML).

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26 Machovec, G. S. Electronic Journal Market Overview – 1997. *Serial Review*, Vol. 23, No. 2, Summer 1997, p. 32-33. (Also available online: URL: http://www.coalliance.org/reports/ejournal.htm)
27 Ibid., p. 32.
28 Chadwell, F.A. and Brownmiller, S. Heads Up: Confronting the Selection and Access Issues of Electronic Journals. *Acquisition Librarian*, No. 21, 1999, p. 31.
29 Lynch, C. Access Management for Networked Information Resources. *CAUSE/EFFECT*, Vol. 21, No. 4, November 1998. (Also available online: URL: http://www.educause.edu/ir/library/html/cem9842.html)
30 Schoonbaert, D. Biomedical Journals and the World Wide Web. *Electronic Library*, Vol. 16, No. 2, April 1998, p. 96.
31 Pullinger, D. Journals Published on the Net. *Serials*, Vol. 7, No. 3, November 1994, p. 243-248.
32 Day, M.W. Online Serials: Preservation Issues. *Serials Librarian*, Vol. 33, No. 3/4, 1998, p. 207.
33 Harter, S.P. and Kim, H.J. Accessing Electronic Journals and Other E-Publications: An Empirical Study. *College & Research Libraries*, Vol. 57, No. 5, September 1996, p. 446.
34 Day, M.W. Op. cit., p. 207-209.
35 De Robbio, A. I periodici elettronici in Internet: stato dell'arte e prospettive di sviluppo. *Biblioteche oggi*, Vol. 16, No. 7, Settembre 1998, p. 46.
36 Luther, J. Full Text Journal Subscriptions: An Evolutionary Process. *Against the Grain*, Vol. 9, No. 3, June 1997, p. 18, 20, 22, 24. (Also available online: *ARL Directory of Electronic Journals, Newsletters and Academic Discussion Lists*. URL: http://db.arl.org/luther.html)
37 Machovec, G. Op. cit., p. 33.
38 Schoonbaert, D. Op. cit., p. 99.

Machovec39 believes that PDF with Adobe Acrobat is commonly used by publishers for converting traditional print to electronic format, since the page will look the same as the printed version. Day40 asserts that its strong position is attested by the fact that in the UK all the journals in the Pilot Site Licence Initiative (PLSI) of the Higher Education Funding Council for England (HEFCE) are available in PDF.
Other online journals use HTML because they take advantage of hyper textual and multimedia links, rather than just replicate print, but Day believes that HTML is not always an ideal format for Science, Technology and Medicine (STM) journals as "it has limitations in encoding some special characters and relies on inline graphics or helper applications for the full display of illustrations."41 Wusterman, describing all these formats, considers "HTML a more viable format for serial article full-text. But it's unlikely to rival PDF for layout quality. PDF will continue to ride high for quite some time until something better appears."42
In the market, some projects are using both techniques in tandem to support searching of the HTML text, while the full-text of the article itself is available in PDF. Day43 and Wusterman44 consider, as examples, the approaches of the International Digital Electronic Access Library (IDEAL) service from Academic Press and Project Muse of the Johns Hopkins University Press (JHUP). De Robbio45 and Machovec46 believe that SGML based projects such as those of Elsevier and Springer-Verlag are likely to become more common.
The choice of electronic format is also highly relevant to the issue of archiving. Tagler believes that in the long-term, SGML "offers the best alternative for the foreseeable future as it is designed to be transferable to developing technologies."47

5.3 Access Methods

There are different methods of access to electronic journal information. De Robbio,48 Luther,49 Machovec50 and Shoonbaert51 discuss the possibilities of providing online access to full-text journals by publishers and aggregators. Machovec asserts that the decision of some publishers to provide their journals through the Internet directly "offers the opportunity for total control, value-added features and no intermediaries."52 Other publishers use an intermediary service, which aggregates the titles from different publishers under one interface or search system. "This means that publishers do not have to create and maintain their own separate system and that the end-user may go to an aggregator for many different titles under a common point of presence."53

De Robbio,54 Luther,55 and Machovec 56 list the major publishers and aggregators with a brief overview of some of the major trends in electronic journal access. Key features about the availability of the service, the numbers of titles, access methods, distinguishing features of their system, details on their products and collaboration with other online products are provided. Luther sought to list companies that offered cover-to-cover reproduction of the print, but found that "even the primary

39 Machovec, G. Op. cit., p. 33.
40 Day, M.W. Op. cit., p. 208.
41 Ibid.
42Wusterman, J. Formats for the Electronic Library. *Ariadne*, No. 8, March 1997. [Online]. *URL: http://www.ariadne.ac.uk/issue8/electronic-formats/*
43 Day, M.W. Op. cit., p. 208.
44 Wusterman, J. Op. cit., p. 12.
45 De Robbio, A. Op. cit., p. 46.
46 Machovec, G. Op. cit., p. 33.
47 Tagler, J. Op. cit., p. 232.
48 De Robbio, A. Op. cit.
49 Luther, J. Full Text Journal Subscriptions. Op. cit.
50 Machovec, G. Op. cit.
51 Schoonbaert, D. Op. cit.
52 Machovec, G. Op. cit., p. 31.
53 Ibid.
54 De Robbio, A. Op. cit., p. 48-52.
55 Luther, J. Full Text Journal Subscriptions. Op. cit.
56 Machovec, G. Op. cit.

publishers may not replicate the complete print version in electronic form, due to the nature of the material."[57]

5.4 Making Electronic Journals Accessible to Users

Librarians must decide how to make users aware of access to electronic journals. An increasing number of libraries are cataloguing electronic journals and providing links from the library Web page.
Chadwell and Brownmiller argue that libraries with a Web interface for their online catalogue can provide hypertext links to an electronic journal allowing the user to move easily from the online catalogue to the electronic publication and this means that users will look to the library for access to electronic journals "just as they have for print publications."[58] Leggate[59] states that librarians have the same responsibilities as with the paper equivalents to make sure that users know about the availability of electronic resources. Duranceau *et al.*[60] in their report from the MIT Libraries E-Journals Subgroup analyse methods of integrating electronic journal acquisitions and bibliographic control into the technical service workflow.

In addition to access through the online catalogue, some libraries use their Web pages to inform users of their electronic journals. Chadwell and Brownmiller[61] and Woodward[62] consider different methods: by alphabetical or subject list. Moothart[63] offers a review describing how four libraries use their home pages for electronic journal access.

6. Pricing Models

Pricing is highly relevant, as it is an area in which there is considerable experimentation at present by publishers: it is constantly changing and a wide range of models is being explored.

Pricing of electronic journals is considerably more complex than for traditional print since the format allows a number of different options to be offered by publishers. Machovec believes that "perhaps one of the most uneven, confusing and frustrating phenomena facing publishers and subscribers is how to charge for electronic journals."[64] Bannerman,[65] Kevil,[66] Prior[67] and Robnett [68] examine various pricing and subscription models available from a number of publishers. The most common include free access with the subscription to the print version; print and electronic combined, at one price or print and electronic with a surcharge (10%-20%). Other models include: a package of all electronic titles of the publisher, with the print version being optional; pricing based on numbers of full time staff, concurrent users, Internet IP ranges, workstations etc; pricing for consortia; prices for individual articles; extra fees for software or platforms.
Prior[69] believes that one reason for this variety is that publishers are looking for a solution suitable to their own circumstances (for example, copyright ownership). On the other hand, libraries consider that the surcharges are high, they are unhappy with taking print and electronic bundles, and would like perpetual access to the electronic version of what they feel they have paid for.

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57 Luther, J. Full Text Journal Subscriptions. Op. cit., p. 18.
58 Chadwell, F.A. and Brownmiller, S. Op. cit., p. 33.
59 Leggate, P. Acquiring Electronic Products in the Hybrid Library: Prices, Licenses, Platforms and Users. *Serials*, Vol. 11, No. 2, July 1998, p. 106.
60 Duranceau, E. *et al.* Op. cit., p. 55-59.
61 Chadwell, F.A. and Brownmiller, S. Op. cit., p. 33.
62 Woodward, H. Op. cit., p. 233.
63 Moothart, T. Providing Access to E-Journals through Library Home Pages. *Serials Review*, Vol. 22, No. 2, Summer 1996, p. 71-77.
64 Machovec, G. Op. cit., p. 32.
65 Bannerman, I. Pricing On-line Journals. *Serials*, Vol. 11, No. 1, March 1998, p. 23-26.
66 Kevil, L.H. Payment and Subscription Models for Online Publications. *Library Acquisitions: Practice & Theory*, Vol. 21, No. 3, 1997, p. 247-248.
67 Prior, A. Electronic Journals Pricing – Still in the Melting Pot? *Serials*, Vol. 12, No. 2, July 1999, p. 133-137.
68 Robnett, B. Online Journal Pricing. *Serials Librarian*, Vol. 33, No. 1/2, 1998, p. 55-69.
69 Prior, A. Op. cit., p. 136.

Robnett states that "pricing is made additionally complex when libraries enter into consortial agreements."70 Prior71 presents as an example of developments of consortial deals, the National Electronic Site Licence Initiative (NESLI), in which a variety of publishers' pricing models are considered. Bannerman,72 considering the UK National Pilot Site Licence Initiative (NPSLI), the Ohio Library and Information Network (OhioLINK) and other consortia, has reservations on the bundle subscription being applied with the assumption that all titles are of equal merit. "There is a danger that these deals disenfranchise the librarian and undermine the role of collection development."73
Meyer74 notes that the pricing model and the traditional role of journals determine the alternatives available to libraries. He describes solutions in which librarians may seek to provide access rather than ownership, to choose consortial purchasing, etc. Meyer believes that the long-term solution may be a class action suit to break up the monopoly power of publishers.

There are experiments with new models. Bonn75 gives a report on the Pricing Electronic Access to Knowledge (PEAK) experiment, a research project undertaken by the University of Michigan in cooperation with Elsevier Science, to study the consequences of several pricing models on both the user and the publisher.
Pikowsky76 agrees that electronic journals provide a preferable alternative to printed academic journals, because of more efficient communication among scholars at lower cost. Moreover he believes that electronic publishing could lead to a restructuring of the academic publishing industry and encourage significant reductions in the price of scientific journals.
Prior argues that "new 'competitors' are emerging for publishers, as academic institutions and the library community itself establish new publishing alternatives, such as ARL's SPARC [Scholarly Publishing and Academic Resources Coalition] initiative and Stanford University's HighWire Press."77

Considering future trends Robnett78 believes that pricing by transaction may eventually dominate the online serial domain. "One consideration is that serials budgets will be redefined, as libraries purchase access in units of articles, an open ended concept quite different from the now prevalent subscription."79
Prior80 states that consortia pricing is taking off fairly substantially, whilst there is a growing interest in pay-per-view. The author foresees that the electronic version of a journal will dominate, with print as an optional extra at a price. Experimental new models, such as those of the PEAK project, will continue and grow. Bannerman, on the complexities of pricing options, asserts that "the market is clearly immature and the best position for any publisher or librarian to take is one of openness and flexibility."81

7. Cataloguing and Metadata

With the widespread acceptance of electronic journals it is important to decide whether to treat them like other journal holdings in regard to cataloguing records, or whether special procedures are needed. In the literature discussion has been around issues such as defining the term serial, the purpose of catalogues and the relationship between traditional cataloguing and metadata.

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70 Robnett, B. Op. cit., p. 58.
71 Prior, A. Op. cit., p. 137.
72 Bannerman, I. Op. cit., p. 25.
73 Ibid.
74 Meyer, R.W. Monopoly Power and Electronic Journals. *Library Quarterly*, Vol. 67, No. 4, October 1997, p. 325-349.
75 Bonn, M.S. A Report on the Peak Experiment. *D-LIB Magazine*, Vol. 5, No. 6, June 1999. [Online].
URL: http://www.dlib.org/dlib/june99/06bonn.html
76 Pikowsky, R.A. Electronic Journals as a Potential Solution to Escalating Serials Costs. *Serials Librarian*, Vol. 32, No. 3/4, 1997, p. 51-52.
77 Prior, A. Op. cit., p. 134.
78 Robnett, B. Op. cit., p. 68.
79 Ibid.
80 Prior, A. Op. cit., p. 137.
81 Bannerman, I. Op. cit., p. 26.

All authors discuss the definition of a serial. Hirons and Graham[82] discuss serials in a broader context, dividing bibliographic materials into static and on-going publications. Graham and Ringler,[83] discussing the *Anglo-American Cataloguing Rules,* 2nd ed. 1988 revision *(AACR2)* definition of a serial, suggest the rubric "bibliographic hermaphrodites" having the characteristic of continuing "updatability." Jones[84] addresses the possibility of a future model not based on terms such as monographs and serials, while Shadle[85] asserts that cataloguers adopt diverse strategies to identify the journal nature of publications regardless of whether or not they satisfy the *AACR2* definition.

The *AACR2* is the subject of several articles. Anderson and Hawkins[86] provide an overview of the developments in cataloguing standards for computer files, which include *AACR2* Chapter 9, the USMARC to accommodate Internet resources, and policies and practices of the *Cooperative Online Serials (CONSER) Cataloging Manual.* Shadle[87] examines some specific problem areas in the *AACR2* which are not easily applicable to electronic journals published and distributed on the Internet, such as the identification of a first issue and of the term "chief source", the existence of multi-file formats, the mutability of materials, and the online versions of printed journals. He discusses the current approaches that cataloguers have developed as temporary solutions to these problems.
Hawkins[88] presents an annotated list of electronic journals, to demonstrate some of the cataloguing problems and design features of electronic journals that influence cataloguing decisions. Problems such as title and file format changes are noted, as well as features such as article based delivery and dispersal of issue content into searchable databases. Shadle *et al.*[89] present current CONSER policy and then examine the practices of three institutions which are cataloguing electronic journals.
The article edited by Duranceau[90] examines whether libraries should use their catalogues to lead users to electronic journals they do not control and considers the role of the Online Public Access Catalogue (OPAC).

Wool[91] presents the relationship between traditional cataloguing and the documentation of electronic data files (metadata), showing that cataloguing has changed as result of information technology, but also that metadata is essentially an extension of traditional cataloguing. Showing that cataloguing and metadata collection are essentially the same, the author states, that "cataloging is seen to be more than just the creation of bibliographic records in libraries, and metadata, more than just the documentation of electronic datasets."[92]
Gradmann[93] also compares metadata, particularly the Dublin Core, and traditional cataloguing. He advocates developing a complementary approach to the two methods of document description, and finding ways to integrate them in order to broaden access to information.

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82 Hirons J. and Graham, C. *Issues Related to Seriality*. Paper presented at the International Conference on the Principles and Future Development of AACR, Toronto, Canada, October 23-25, 1997. [Online]. URL: http://www.nlc-bnc.ca/jsc/confpap.htm [Unavailable in October 2002]
83 Graham, C. and Ringler, R. Hermaphrodites and Herrings, in: Duranceau E.F., ed. Old Wine in New Bottles?: Defining Electronic Serials. *Serials Review*, Vol. 22, No. 1, Spring 1996, p. 73-77
84Jones, E. Serials in the Realm of the Remotely-Accessible: An Exploration, in: Duranceau E.F., ed. Old Wine in New Bottles?: Defining Electronic Serials. Op. cit., p. 77-79.
85 Shadle, S.C. A Square Peg in a Round Hole: Applying AACR2 to Electronic Journals. *Serials Librarian*, Vol. 33, No. 1/2, 1998, p. 151-152.
86 Anderson, B. and Hawkins, L. Development of CONSER Cataloging Policies for Remote Access Computer File Serials. *Public-Access Computer Systems Review*, Vol. 7, No. 1, 1996, p. 6-25. (Also available online: URL: http://info.lib.uh.edu/pr/v7/n1/ande7n1.html)
87 Shadle, S.C. Op. cit., p. 147-166.
88 Hawkins, L. Serials Published on the World Wide Web: Cataloging Problems and Decisions. *Serials Librarian*, Vol. 33, No. 1/2, 1998, p. 123-145.
89 Shadle, S. *et al.* Electronic Serials Cataloging: Now That We're Here, What Do We Do? *Serials Librarian*, Vol. 30, No. 3/4, 1997, p. 109-127.
90 Duranceau, E.F., ed. Cataloging Remote–Access Electronic Serials: Rethinking the Role of the OPAC. *Serials Review*, Vol. 21, No. 4, Winter 1995, p. 67-77.
91 Wool, G. A Meditation on Metadata. *Serials Librarian*, Vol. 33, No. 1/2, 1998, p. 167-178.
92 Ibid., p. 176.
93 Gradmann, S. Cataloguing vs. Metadata: Old Wine in New Bottles? *International Cataloguing and Bibliographic Control*, Vol. 28, No. 4, October-December 1999, p. 88-90.

Xu,94 examining the metadata movement on the Internet, points out the need to use OPAC as the gateway to access to library metadata repositories. She conceptualises a metadata conversion system, built into library OPACs for metadata integration and display, and argues that the newly integrated metadata can utilise the full functionality of the library OPAC, with benefits for libraries. Collections could be expanded to incorporate a wide variety of information on the Internet giving library users access to a wealth of information resources.
Gradmann has his doubts about the practicability of this proposal but regards it as "one important direction to investigate for librarians."95

8. Archiving

While the traditional problems of binding, storage, microfilming, etc. are obviated by electronic journals, these forms have their own problems. Archiving requires its own financial, technical and computing resources which give rise to problems of technological obsolescence, document longevity and the maintenance of data integrity.
Discussion in the literature also refers to the most suitable format for archiving, to the archiving responsibility of publisher or library, selection of titles to be preserved, length of online availability and perpetual access rights.

8.1 Technological Obsolescence and Preservation Strategies

Day asserts that "digital media, both magnetic and optical, have short lifetimes in comparison with media such as paper and microfilm."96
Luijendijk97 advocates the practice of "technology refreshing," the periodical transferring of the data onto a new medium to ensure longevity and to provide easy, universal access in the long run. However Day, who uses the term "digital refreshing," observes that the focus has moved from this issue, not because the problems have been solved, "but because there is a greater awareness of significant technological problems associated with hardware and software obsolescence."98
Neavill and Sheblé discussing the longevity of digital storage media, also believe that their short life-expectancies is not "a significant problem in … the long-term preservation of digitally encoded information."99 Rothenberg100 has suggested the creation of "emulators-programs that mimic the behaviour of hardware" to replace obsolete hardware in the future. Day101 proposes as "a more realistic answer," the concept of data migration.
The Task Force on Archiving of Digital Information defines migration as "the periodic transfer of digital materials from one hardware/software configuration to another, or from one generation of computer technology to a subsequent generation."102 According to Day, it differs from refreshing by taking account of the hardware/software obsolescence problem and transfers to new formats while preserving the integrity of the information, and he suggests that "migration strategies used should be recorded as metadata and preserved together with the original item so that future users are aware of significant changes made to a document during the preservation process."103

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94 Xu, A. Metadata Conversion and the Library OPAC. *Serials Librarian*, Vol. 33, No. 1/2, 1998, p. 179-198.
95 Gradmann, S. Op. cit., p. 90.
96 Day, M.W. Op. cit., p. 210.
97 Luijendijk, W. Archiving Electronic Journals: The Serial Information Provider's Perspective. *IFLA Journal*, Vol. 22, No. 3, 1996, p. 210.
98 Day, M.W. Op. cit., p. 210.
99 Neavill, G.B. and Sheblé M.A. Archiving Electronic Journals. *Serials Review*, Vol. 21, No. 4, Winter 1995, p. 16.
100 Rothenberg, J. Ensuring the Longevity of Digital Information. February 1999. [Online]. URL: http://www.clir.org/pubs/archives/ensuring.pdf
101 Day, M.W. Op. cit., p. 211.
102 Task Force on Archiving of Digital Information *Preserving Digital Information.* May 1996. [Online]. URL: http:// www.rlg.org/ArchTF/tfadi.index.htm
103 Day, M.W. Op. cit., p. 211.

Russell104 outlines the important CURL105 Exemplars in Digital Archives (CEDARS) project which was set up in 1998 and is tackling strategic, methodological and practical issues in the creation of digital archives. It aims to recommend a model for best practices in digital preservation.

8.2 Intellectual Integrity

While much discussion on archiving has focussed on physical preservation of the journal, Tagler believes that authors are more concerned with preserving the integrity of their texts: "It is also not just a matter of archiving, but preserving the integrity of the article as well."106
Establishing and maintaining the integrity of information is becoming more difficult because digital information is easy to change and update. Neavill and Sheblé107 argue that the malleable nature of the electronic text raises the problem of the authentication of records and the identification of successive versions. "Intellectual preservation of electronic media includes identifying [different] versions of documents and keeping track bibliographically of the distinctions between them."108 Graham109 discusses several methods of distinguishing, authenticating and citing versions of electronic documents.

Intellectual preservation therefore becomes an important issue. The Task Force on Archiving of Digital Information110 lists a number of factors which help to ensure the integrity of digital information. These include content, fixity, reference, provenance and context.

8.3 Archiving Responsibilities

Publishers, individual libraries, national libraries, aggregators and library consortia are all candidates for creating electronic journal archives. Keyhani111 analyses each of these players: publishers, he argues, have had the opportunity to think about how much is involved in creating an archive. The insistence by libraries on perpetual access to a permanent archive and the awareness that users prefer to search by subject area across all journals regardless of publisher, are factors that have had a significant influence on publishers and it does not make economic sense for them to invest the resources needed to create an archive.112
Lujiendijk113 considers a possible scenario in which publishers and vendors, most of which are becoming involved in document delivery, will have some interest in archiving or having access to archives. Keyhani, considering the role of aggregators in archiving, asserts that "few of today's aggregators have the technical expertise and infrastructure required to create a permanent archive, and even fewer are willing to commit the financial resources to do so."114
Libraries have traditionally assumed the function of archiving the world's knowledge for their users but Keyhani115 argues that several obstacles are hampering this task: they are faced with diminishing budgets, forcing cancellations of journals and, like publishers, they are more focussed on content than on technology. So they have little money to invest in archiving.
Neavill and Sheblé argue that "the library's emphasis on mediating access to current information as well as the preservation of information is unique, and the library has yet to experience serious competition in this role."116 They predict little change in the library's importance as the long-term preserver of

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104 Russell, K. Digital Resources into the Future: Digital Preservation and the CEDARS Project. *Serials*, Vol. 12, No. 3, November 1999, p. 259-267
105 Consortium of University Research Libraries.
106 Tagler, J. Op. cit., p. 231.
107 Neavill, G.B. and Sheblé, M.A. Op. cit., p. 17.
108 Ibid.
109 Graham, P.S. Intellectual Preservation and the Electronic Environment, in: Martin, R.S., ed. *Scholarly Communication in an Electronic Environment: Issues for Research Libraries*. American Library Association, 1993, p. 85-94.
110 Task Force on Archiving of Digital Information. Op. cit.
111 Keyhani, A. Creating an Electronic Archive: Who Should Do it and Why? *Serials Librarian*, Vol. 34, No. 1/2, 1998, p. 219-223.
112 Ibid., p. 220.
113 Luijendijk, W. Op. cit., p. 210.
114 Keyhani, A. Op. cit., p. 221.
115 Ibid., p. 221-222.
116 Neavill, G.B. and Sheblé M.A. Op. cit., p. 19.

information and feel that "libraries will have to take an active role in acquiring and preserving electronic journals even if they do not remain the primary distributor for this publications."117
National libraries, in terms of legal deposit legislation have acted as the central repositories of all relevant publications. Day asserts that "a few have successfully extended legal deposit legislation to cover electronic publications, but this does not usually include online publications."118 The Electronic Publication Pilot Project of the Canadian National Library is an exception. With the publishers' cooperation, it identifies and makes copies of Canadian online journals, texts, etc.
Keyhani argues119 that library cooperatives should increasingly be involved in creating and maintaining centralised archives of electronic journals.
Some libraries are investigating archival solutions through collaborative efforts. Chadwell and Brownmiller,120 Cochenour and Moothart,121 Geffner and MacEwan,122 and Nisonger123 focus on the CIC, a consortium of some major American research universities, which seeks to archive electronic journals available on the Internet through its Electronic Journal Collection (EJC).124

8.4 Selection of Archival Titles

Discussion about electronic journals involves also what to archive and for how long. Nisonger125 believes that most traditional library functions are applicable to electronic journals and consequently part of the collection management responsibility involves the selection of titles to be archived. Cochenour and Moothart126 suggest that libraries should "step up to the challenge" to exercise the same collection management decisions that they take in regard to printed material.
Addressing the question of retaining material online, Tagler believes that:

> "probably a ten-year period would be a reasonable rule of thumb for scientific material. But it is difficult to generalize since some fast-moving areas of science (like genetics or artificial intelligence) become obsolete quickly while others have a longer life span (like mathematics where it is not uncommon to retrieve a 10-year old paper)."127

8.5 Assuring Perpetual Access

Duranceau128 maintains that libraries want the assurance of perpetual access to electronic journals they have bought, even if they cancel their subscriptions and to be able to make them available in the same manner as printed journals.
The author examines how five full-text electronic journal providers are handling archiving to ensure perpetual access to electronic journals that libraries have purchased. The Journal Storage Project (JSTOR), a non-profit organisation emphasising its mission to develop an archive of back files of scholarly journal literature, has made provision for libraries to obtain a CD-ROM version of purchased material upon subscription cancellation. Johns Hopkins University Press' (JHUP) Project Muse provides perpetual access and supplies a CD-ROM archival disk to its subscribers annually throughout their subscription and Online Computer Library Center's (OCLC) Electronic Collection Online (ECO) has made a full commitment both to archiving digital material for future scholars, and to providing

117 Ibid.
118 Day, M.W. Op. cit., p. 215.
119 Keyhani, A. Op. cit., p. 222.
120 Chadwell, F.A. and Brownmiller, S. Op. cit., p. 34
121 Cochenour, D. and Moothart, T. Relying on the Kindness of Strangers: Archiving Electronic Journals on Gopher. *Serials Review*, Vol. 21, No. 1, Spring 1995, p. 72.
122 Geffner, M. and MacEwan, B. A Learning Experience: The CIC Electronic Journals Collection Project. *Serials Librarian*, Vol. 33, No. 3/4, 1998, p. 272-273.
123 Nisonger, T.E. Op. cit., p. 62.
124 Now defunct. See note 16.
125Ibid., p. 59-62.
126 Cochenour D. and Moothart, T. Op. cit., p. 74.
127 Tagler, J. Op. cit., p. 227.
128 Duranceau, E.F. Archiving and Perpetual Access for Web-Based Journals: A Look at the Issues and how Five E-Journals Providers are Addressing Them. *Serials Review*, Vol. 24, No. 2, Summer 1998, p. 110-115.

subscribers with Web-based access to cancelled titles. Blackwell's Electronic Journals Navigator (EJN) has developed a full-text electronic journal product with a practical and philosophical decision not to guarantee an archive and Stanford University's HighWire Press do not offer an archive of their titles because they do not consider the technology adequate.

9. Copyright and Licence Agreements

There are complexities and unresolved issues in regard to copyright and licence agreement.
De Robbio129 and Machovec state that "issues surrounding intellectual property rights and electronic media are especially confusing in light of old copyright laws,"130 and because images are passed around the Internet, it is very difficult to manage and define what can and cannot be done. They suggest that in the absence of clear laws, publishers need to have realistic expectations in this regard. Moreover, because libraries have a tradition of sharing journal articles through interlibrary loan, it is important to understand how contracts for electronic journals may alter a library's participation in ILL circuits.
Cox131 and Linke132 refer to the Conference on Fair Use (CONFU) (1994), whose mission was to develop guidelines for fair use in a network environment, including interlibrary loan, electronic reserves, visual images and distance education. The CONFU working party (1996), comprising publishers and librarians, failed to agree on any guidelines, but both authors believe that the dialogue is still alive and will eventually result in guidance to both libraries and academics.

Campfens133 considers the lack of consensus between publishers, users and national authorities on the interpretation of international copyrights. "Consequently, to fill the loophole in existing legislation, licence agreements become a major issue when subscribing to electronic publications."134
Cox135 and Leathem136 argue that publishers and vendors, fearing that copyright law cannot provide protection from illegal copying of electronic documents, favour contracts to define their own and subscribers' rights. Okerson predicts that current licence arrangements "might, in fact, be achieving what we once expected from legislation and getting us there more quickly"137
The literature therefore agrees with Linke that "when a license is signed … the contract, not copyright law, governs uses of the text."138 Licensing is a complex new area which involves an obvious need for a clear legal framework which recognises rights of both information providers and users. Leggate examines some current licensing in the UK and warns that "current licences can contain conditions which are undesirable, ambiguous or unenforceable."139

9.1 Practical Considerations

There is a wide variation in licence conditions, with restrictions imposed and problems of interpretation and enforcement. Davis and Reilly140 believe that the licensing process requires legal expertise and skills beyond the training and experience of most librarians.
Leathem141 and Linke142 agree that the librarian may need the guidance of lawyers and that consultation with knowledgeable authorities can "provide the best protection for the institution and

129 De Robbio, A. Op. cit., p. 47-48.
130 Machovec, G. Op. cit., p. 33.
131 Cox, J. E. Publishers, Publishing and the Internet: How Journal Publishing Will Survive and Prosper in the Electronic Age. *Electronic Library*, Vol. 15, No. 2, April 1997, p. 128.
132 Linke, E. On Beyond Copyright. *Serials Librarian*, Vol. 33, No. 1/2, 1998, p. 73.
133 Campfens, Y. Contracts, Copyright and Cost: Negotiating E-Journals into the Corporate Environment. *Serials*, Vol. 12, No. 2, July 1999, p. 158-159.
134 Ibid., p. 159.
135 Cox, J. Op. cit., p. 129.
136 Leathem, C.A. Op. cit., p. 24.
137 Okerson, A. Copyright or Contract? *Library Journal*, Vol. 122, No. 14, September 1997, p. 139.
138 Linke, E. Op. cit., p. 76.
139 Leggate, P. Op. cit., p. 104.
140Davis T.L. and Reilly, J.J. Understanding License Agreements for Electronic Products. *Serials Librarian*, Vol. 34, No. 1/2, 1998, p. 247-260.
141 Leathem, C.A. Op. cit., p. 24.
142 Linke, E. Op. cit., p. 76.

users by setting up the most favorable license possible."143 Davis and Reilly144 give in-depth guidance on the steps required to enter into a licence agreement.
Linke145 and Smith146 suggest as an excellent source on licensing issues, the Web site run by Yale University Library, called *Liblicense* (http://www.library.yale.edu/~llicense/)
Gammon,147 referring to the USA experience in consortial purchasing within Ohio LINK, considers *Principles on Licensing Electronic Resource* (http://www.arl.org/scomm/licensing/principles.html), as a key document in educating librarians about dealing with licences.

Bosch focuses on "new directions that could improve licensing … where a general framework protects the rights of users and producers as opposed to separate contracts for each product."148 He suggests149 that libraries, vendors and producers need to explore such problems as the development of common templates/boilerplates, common principles, a common vocabulary, blanket licences and third party brokering. He examines what libraries can do to begin the transformation of the licensing environment, in order to reduce the considerable cost of individual contracts that could be better spent to the benefit of library users.

10. User Studies

The value of user surveys on the provision of electronic journals as responses to some of the problems in these fields, is becoming an area of increasing interest.
Some studies focus attention on the level of acceptance and awareness of electronic journals.
Dijkstra150 reports on the Delivery of Copyright Material to End users (DECOMATE) European Project, (1995-1997), carried out by Tilburg University, Universitat Autònoma de Barcelona, and the London School of Economics and Political Science. The scheme provided end users with electronic access to copyrighted material from their desktops, and a principal objective was to carry out an intensive user study to examine the usefulness and effects of electronic document distribution. Data were collected and analysed in regard to amount and type of usage, ergonomic issues and user acceptance. It revealed various factors that either inhibit or encourage use. This DECOMATE service was valued by the users and proved useful in the short period of time allocated to the study. Dijkstra believes that the single most influencing factor affecting the study was this time span. "Users require time to adjust to a new service and to start using it to genuinely support their research rather than just to satisfy curiosity."151
This factor leads naturally to a discussion of the need to promote any new facilities.
In their study, Tomney and Burton152 assess attitudes towards electronic journals and examine their current level of use by academics in five faculties of a British university. The results of this survey (1996-1997) suggest that academics are aware that material is available in this new medium and are not dismissive of its possibilities, but as yet make little use thereof. Tomney and Burton conclude that there is the need to encourage academics in the use of electronic journals, by means of training courses, publicity, demonstrations. In this process there is a role not only for the librarians and computing services but also for publishers and professional associations.153
Hietink,154 on the basis of the experiences of The University Licensing Program (TULIP) project in the USA and the Elsevier Electronic Subscriptions (EES) program, offers a guideline for library

143 Ibid.
144 Davis, T.L. and Reilly, J.J. Op. cit.
145 Linke, E. Op. cit., p. 78.
146 Smith, M. Op. cit., p.135.
147 Gammon, J. Consortial Purchasing: The U.S. Experience with Electronic Products. *Serials*, Vol. 11, No. 2, July 1998, p. 112-113.
148 Bosch, S. Licensing Information: Where Can We Go from Here? *Library Acquisitions: Practice & Theory*, Vol. 22, No. 1, 1998, p. 45.
149 Ibid., p. 45-47.
150 Dijkstra, J. Journals in Transition: From Paper to Electronic Access: The Decomate Project *Serials Librarian*, Vol. 33, No. 3/4, 1998, p. 243-270.
151 Dijkstra, J. Op. cit., p. 263.
152 Tomney, H. and Burton, P.F. Op. cit., p. 419-429.
153 Ibid., p. 427-428.
154 Hietink, M.A. A Publisher's View on Facilitating Optimal Awareness and Usage of a New Electronic Journal Service: Promotion and Training. *Library Acquisitions: Practice & Theory*, Vol. 21, No. 3, 1997, p. 365-372.

organisations installing new electronic services and concludes that "promotion and training … may be considered as one of the attention points and critical factors for success."[155]
The UK project called SuperJournal is described by Mabe as a unique collaboration between publishers, universities and libraries to develop "a multiple electronic journal application for assessing user behaviour."[156] His preliminary conclusions found that there are high levels of browsing by all users, and moreover, content, browsing and printing are the most important "functionalities."[157]

Rusch-Feja and Siebeky[158] describe, within the Max Planck Society, in Germany, a survey which aimed to investigate researchers' use and acceptance of electronic journals. The data showed a growing interest in electronic journals and the advantages indicated by the respondents suggest that the principal reason for abandoning the print version of a journal in favour of the electronic version is the easy desktop access, the ease of downloading and citing elements, and the currency of content.

11. The Role of the Librarian

The decision to include electronic journals in library collections requires a revaluation of the role of the librarian in the electronic age. In this literature review it has been seen that authors reflect different views.
Pikowsky[159] emphasises that librarians have a major role to play in influencing the growth of electronic journals: since they are responsible for organising and retrieving information, they should take part in the design of search engines necessary to locate the electronic articles needed by users, and since archiving has traditionally been a function of libraries, librarians should seek to resolve this issue.
Campfens[160] adds that the librarian increasingly takes on the role of trainer, helping the user to navigate his way around new electronic systems and services, filtering and sifting information to help him deal with the new information overload.
To the roles of information guide to the new technology, and of promoter of the services, must be added the librarian's participation in consortia.
Tammaro[161] believes that library consortia offer the librarian a new way of surveying the market, experimenting with suppliers, negotiating pricing and licensing. Library consortia could themselves become producers of electronic information. "Only if librarians join together in consortia can the libraries remain among the major players of the electronic publishing industry and continue to procure access to this material for their users."[162]
Finally, Leathem[163] judges it a truism to state that electronic journals present new challenges or to assert that they are here to stay. "The librarian's role is to understand and anticipate the impact of this new medium and develop the knowledge and skills necessary to use it to further the work of the library and [the] needs of its patrons."[164]

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155 Ibid., p. 372.
156 Mabe, M. SuperJournal: The Publisher's Perspective. *Serials*, Vol. 11, No. 2, July 1998, p. 117.
157 Ibid., p. 121.
158 Rusch-Feja, D. and Siebeky, U. Evaluation of Usage and Acceptance of Electronic Journals: Results of an Electronic Survey of Max Planck Society Researchers including Usage Statistics from Elsevier, Springer and Academic Press (Full Report*). D-Lib Magazine*, Vol. 5, No. 10, October 1999. [Online].
URL: http://www.dlib.org/dlib/october99/rusch-feja/10rusch-feja-full-report.html
159 Pikowsky, R.A. Op. cit., p. 52.
160 Campfens, Y. Op. cit., p. 160.
161 Tammaro, A.M. Modelli economici per i periodici elettronici. *Biblioteche oggi*, Vol.16, No. 5, Giugno 1998, p.63.
162 "Solo se i bibliotecari si associano c'e' la certezza che le biblioteche rimarranno tra i maggiori attori dell'industria dell'editoria elettronica periodica e continueranno a procurare l'accesso ad essa per gli utenti." Ibid.
163 Leathem, C.A. Op. cit., p. 25.
164 Ibid.

12. Conclusions

Odlyzko165 has argued that traditional scholarly journals are likely to disappear within the next ten to twenty years and Tomney and Burton maintain that "there is a future for electronic publication "adding that

"it will take time for electronic journal titles to become established and respected.166

In this transformation therefore, there are problems and issues to be confronted. This review has shown that the literature identifies a series of questions in the current debate on electronic journals and has revealed that there are strong reasons to believe that electronic journals will eventually become commonplace, because they offer distinct advantages over print journals.

There are encouraging signs that the emergence of online publishing has promoted the dialogue between publishers, librarians and vendors. Evaluating and managing the issues that go with electronic journals is a growing challenge for these players and most authors believe that librarians should seize the chance to be active participants in this process.

165 Odlyzko, A. M. Tragic Loss or Good Riddance? The Impending Demise of Traditional Scholarly Journals. *International Journal of Human-Computer Studies*, Vol. 42, No. 1, 1995, p. 72.

166 Tomney, H. and Burton, P.F. Op. cit., p. 428.

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(*ARL Directory of Scholarly Electronic Journals and Academic Discussion Lists)*
URL: http://www.arl.org/scomm/edir/index.html

BUBL LINK. Electronic Journal Collections
URL: http://bubl.ac.uk/link/e/electronicjournalcollections.htm

CARL: Colorado Alliance of Research Libraries. Electronic Journal Miner
URL: http://ejournal.coalliance.org/

CIC Electronic Journals Collection
URL: http://ejournals.cic.net/index.html

Current Cites
URL: http://sunsite.berkeley.edu/CurrentCites/

Harrassowitz. Electronic Journals: A Selected Resource Guide
URL: http://www.harrassowitz.de/top_resources/ejresguide.html

Index Morganagus
URL: http://sunsite.berkeley.edu/IndexMorganagus/

Liblicense
URL: http://www.library.yale.edu/~llicense/

MIT Libraries. VERA: Virtual Electronic Resource Access
URL: http://river.mit.edu/mitlibweb/FMPro?-db=RS_Items.fp5&-Lay=web&-format=ro_search.htm&-findany

NASIG: North American Serials Interest Group
URL: http://www.nasig.org

Newjour: Electronic Journals and Newsletters
URL: http://gort.ucsd.edu/newjour/

Serials in Cyberspace: Collections, Resources, and Services
URL: http://www.uvm.edu/~bmaclenn/

UKSG: United Kingdom Serials Group
URL: http://www.uksg.org

World Wide Web Virtual Library: E-Journals.Org
URL: http://www.e-journals.org