A general overview of the e-resource industry

CHRIS ARMSTRONG

Information Automation Limited

RAY LONSDALE

Reader, Department of Information Studies, University of Wales, Aberystwyth

The E-Resources Management Handbook – UKSG

In offering an overview of the e-resource industry today, this chapter opens with a discussion of some of the major societal influences that are shaping the creation and reception of electronic information products. There follows an examination of developments in e-resource publishing, focusing on key formats including databases, open access resources, e-journals, e-books, e-theses, geospatial and multimedia and moving image e-resources, as well as some emerging formats. Brief consideration is given to the problems of defining e-resource types, and to the issues surrounding their management in the information and library sector. The chapter concludes with an exploration of some of the future trends in e-resource publishing.

Influences on e-resource provision

Since the publication of *The Serials Management Handbook*[1], developments within the academic e-resource industry have continued apace, with respect to both established and emerging e-formats. An array of powerful and diverse influences combine to condition the industry, some of which are, in turn, influenced by the publishing and production – a strong symbiotic relationship exists.

General technological advances including the emergence of broadband, the proliferation of 3G phones, computer games, and developments in the media such as radio online and p2p networking (e.g. Kazaa) continue to exert a powerful influence and shape societal expectations. Internationally, the concept of digitizing the social, cultural and political heritage of a nation has taken hold. Early examples, such as the Vatican Project, are matched by large-scale national projects such as the Oxford digitization projects, and Gathering of the Jewels, originally developed at the National Library of Wales. The desire to preserve and disseminate our national cultural heritage in turn reinforces the presence and significance of electronic resources within society.

National strategies and agendas within the government and the sectors of education, public service, and information and library services (ILS) continue to impact upon the e-resource industry in that they influence awareness and status of e-formats, creating new demands, sometimes offering strategic direction, driving forward the industry. Within the sphere of education in the UK, for example, several key agendas inform the current development of e-resources, and their provision and use. One of the most powerful has been that of Lifelong Learning. Within the schools sector, this has been manifest in The National Grid for Learning (NGfL) which has facilitated investment of over £1 billion in information and communication technology (ICT) during the period 2001–2004. Of course, the consequence of this extends beyond the school, inculcating an awareness of the importance of e-resources among those students who move into tertiary education. Lifelong Learning has impacted directly upon tertiary education too, with the establishment of the University for Industry and learndirect. Outside formal education, another manifestation of the Lifelong Learning agenda is the establishment of the People's Network within the public libraries, a seminal influence in terms of broader societal expectations and demand for e-resource provision.

An equally significant education agenda is the move towards creating a unified e-learning strategy which the Department for Education and Skills (DfES) in England announced in 2005, and which is paralleled in similar strategies established in Northern Ireland, Scotland and Wales. These strategies are ambitious, covering the whole educational spectrum, and have the objective of building the 'common ground that brings all our education and children's services to the critical baseline of being able to use the technology well'.[2] As such they will impact greatly upon the e-resource industry, creating an increased demand for quality e-resources and placing even greater responsibilities on the information and library sector to ensure provision and uptake of resources.

Within the education and ILS sectors, national bodies are working to deliver the government's strategic aims. For example, within the orbit of tertiary education, an influential initiative is the establishment of the Joint Information Systems Committee's (JISC) e-Framework for Education and Research. The programme, which is designed to support the vision outlined in the DfES e-strategy towards 'a common digital infrastructure to support transformation and reform', is a joint initiative with Australia's Department of Education, Science and Training that brings together and builds on the successes of a number of JISC development programmes, including the Information Environment activity, e-Learning Framework and the Virtual Research Environment Programme. The Information Environment facilitates the deposit and sharing of e-content to colleges and universities. As the JISC indicates, 'The current collection of JISC funded content has the potential to grow to embrace both externally generated content from publishers and aggregators and community-generated resources.'[3] and the establishment of the six collection groups for e-resources has acted as a major catalyst to e-resource production in the UK. One would anticipate that the establishment of The National Grid Service within the e-Science programme, which is the core UK system intended for the production and use of computational and data resources for e-research, will also combine to generate resource production. Amongst other national bodies such as the Museums, Libraries and Archives Council, and British Educational Communications and Technology Agency, the British Library is centrally concerned with managing the UK's digital future, responding to and, in turn, influencing the production of e-resources. It recognizes that it must not act solely as an archive, but should 'play an important role in shaping the web'.[4]

In striving to accommodate the implications of these influences and to provide access to e-resources and ensure their uptake, libraries face a range of challenges. Amongst the most significant are those associated with definition. The recent five-year longitudinal study of the provision and use of e-resources in further and higher education (FE/HE) in the UK, JUSTEIS[5], revealed major ignorance on the part of students and academic staff with regard to their knowledge and understanding of certain e-formats. The convergence of technologies has exacerbated matters. A good example is the continuing debate within the profession as to the nature of e-resources, which is articulated below. To help, staff and clientele have agreed working definitions, and some university libraries have created taxonomies of e-formats, which are also used as the basis for policy statements. Other significant challenges concern bibliographical control, rights issues, licensing, archiving, monitoring and evaluating use, and other collection management concerns, as well as information literacy skills. Some of these issues are briefly covered later in the chapter, and a number also constitute substantive chapters to be published by the UKSG as part of this e-book. Before this exploration, the central section of the chapter examines in detail some of the major developments in the e-resource industry.

Trends in e-resource publishing

That academic libraries are responding to the increase in output of e-resources and the various agendas outlined above is evident in the findings of JUSTEIS. One strand of the study, which commenced in 1999, comprised a detailed analysis of the e-resource content of the web sites of the ILS within 141 HEIs and 43 colleges of FE. The results confirmed that a significant array of e-resources was made available at each institution. As in the three previous cycles, the fourth cycle of the study, undertaken in 2002/3, showed that over 80% of web sites linked to each of the 12 major e-resource types identified by JUSTEIS. Since that study, developments such as the recent NoWAL (North West Academic Libraries) agreement with

NetLibrary would suggest that the range and volume of e-resources offered by university and college ILS continue to expand.

In order to offer an overview of the industry, it is necessary to consider this range of e-resources available to libraries and information units, and in order to structure the discussion, this section treats e-resources by type of format. It would be possible to take other approaches, for example by distribution medium (online, CD ROM, Internet, web), by subject coverage, or by content (citation, full text, etc.) but, as JUSTEIS has suggested that all resources are often viewed as variants on search engines, it is useful to distinguish database from e-journal and e-book from open access archive. Any taxonomy faces problems of categorization but there are a number of established formats with which to start.

Databases

The earliest form of e-resource dates from a time before the 'e-' prefix had been coined and probably before information sources or services were called resources! The earliest databases – available through online hosts such as Dialog or BRS – were bibliographic, although without abstracts, limited in coverage of time and topic, and accessed at speeds we would now consider unacceptable. Current databases frequently carry the full text of articles, or factual information (e.g. chemical materials, data sheets or statistics), or data that may be manipulated online; are often linked so that a bibliographic reference found in one database may take the user directly to the full text in another (e.g. CrossRef or ArticleLinker, discussed in a later chapter of this UKSG e-book); normally have a web interface; and are often free or chargeable per view without prior subscription, e.g. BL Direct. The near universal move to a web interface from the old typed commands means that users intuitively understand the mechanics of entering a search, although normally this is at the expense of much of the flexibility and power of the command-based input.

Although the web has led to many information providers publishing their own databases directly, hosts or aggregators still exist. These bring together collections of databases from different providers and often allow searches to be made across collections of databases – something made possible by a near uniform record structure. Some services, such as Ovid, offer federated searching which allows access to databases, books and journals in one aggregation. Within the FE/HE sector the JISC has funded three 'data centres': BIDS (Bath Information and Data Services), MIMAS (located at Manchester University), and EDINA (Edinburgh University), the latter two of which offer collections of e-resources to those communities in the same way as their commercial counterparts do to industry and business. The sector benefits from single password recognition for all resources that are licensed to an institution (Athens and Shibboleth).

Already it will be apparent that the taxonomy offered is not easily circumscribed, as the access points which lead users to databases also lead – sometimes via a single search – to e-journals or e-books. BL Direct offers a bibliographic database that is also a document delivery service, while resources such as the *Oxford English Dictionary* may be viewed as either a database or an e-book – it is an electronic replication of a print product, but the essence of the e-resource is its searchable database of words. The semantics of e-resources do little to help the uninitiated.

A particular type of database is the online search facility available from library catalogues, which, with the advent of web access and standards such as Z39.50, widens usage to libraries from any web-connected computer. OPACs (Online Public Access Catalogues) are individually available, or searchable as 'clumps' or union catalogues such as COPAC – which offers access to 24 major libraries plus the British Library, the National Library of Scotland, and the National Library of Wales in a single search; InforM25 – which offers simultaneous access to over 150 college and university library catalogues in the London area; and The European Library (previously known as Gabriel Gateway and Bridge to Europe's National Libraries) – which will ultimately cover the 43 national libraries of Europe.

E-journals

To be distinguished from full-text databases containing only the articles from journals, e-journals are either the electronic replication of a print journal or – as in the case of *Ariadne* or *Information Research*, for example – a born-digital, electronic-only journal. Many of the latter are free, and an excellent directory of these is available at Directory of Open Access Journals. E-journals tend to follow the structure of print journals and their web site is usually fronted by some general information about the title, and an index to volumes and issues; this, in turn, tends to lead to a normally free abstract before a charge is made to access the full text, often as a PDF document. It is interesting to speculate on why the volume/issue approach remains in place as arguably it would be more helpful to the scholarly publishing process for articles, features and reviews to be dated and added as reviewing and editing is completed. An e-mail alerting system could be tailored so that readers receive notification of all articles or of articles only on a particular focus or subject.

Where there is also a paper-based journal, it is common for the e-journal to be supplied in addition and on the same subscription. This is at least partly due to an anomaly of the UK VAT laws, which means that an e-journal is treated differently from a paper journal and attracts tax; however, if the e-journal is supplied with the charged-for paper journal, VAT is not applied.

While those e-journals available in parallel with a print journal normally follow an identical structure, the e-only journals often include facilities that could not easily be made available on paper, such as the ability to add comments to articles or ask questions of the author. Many publishers (e.g. Emerald) now have considerable collections of e-journals, while at the same time aggregators such as Ingenta offer collections of titles from a range of publishers, through a single subscription to some or all of the aggregation. While this has the advantage of bringing many publishers together under one licence, it is far from unusual for university libraries to need several of these relatively expensive (even under JISC deals) aggregator licences in order to acquire the coverage that their institution needs.

Although e-journals have been an accepted part of most academic libraries for many years, for many academics there remain discernible misgivings where scholarly publishing in an e-journal with no paper counterpart is concerned. However, the Research Assessment Exercise, which demands scholarly publishing in peer-reviewed journals, would appear to be becoming more accepting of journals without a high impact factor, and thus, of these e-journals.

Many of the above remarks also relate to e-newspapers and e-magazines. A large number of newspapers and magazines are available – either free or for a fee on the web; some require a subscription, although they may still be free. Unlike e-journals it is rare for newspapers to provide full electronic coverage, even in cases where the web version is supplemented by a live feed to your desktop. It also seems likely that deep-rooted reader habits will not be completely accepting of e-newspapers in this decade.[6]

Open access e-resources

With the increasing number of journals accessible on the web, development of common search standards is fundamental to effective discovery and access. The Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) is such a set of standards, which allow description of the information within the archive or collection (e.g. title, author/s and abstract of a research article) to be automatically shared between archives. Organizations such as BioMed Central, which archives over 100 open access journals covering all areas of biology and medicine, support this protocol.

However, free e-journals are not the only form of open access to scholarly work. An alternative is self-archiving, a practice in which authors deposit a copy of their work in an open access archive or even on his/her own web pages. The self- or open-archiving initiative, referred to above, was developed by Stevan Harnad in the mid 1990s in response to an ongoing crisis in serials pricing which curtailed the number of journals that educational institutions could afford, thereby effectively robbing research of much scholarly communication. As we suggested above, the serials crisis remains a significant issue for libraries, a view supported by Paul Ayris at a recent meeting on the future of scholarly communication.[7] The Open

Archives Initiative facilitates document archives, and preprint and postprint servers connected with a common and easy-to-use interface, and related services such as distributed retrieval options. Major examples would be arXiv.org, the preprint server established at the Los Alamos National Laboratory in 1991, which specializes in high energy physics and related fields; CogPrints, which archives publications in psychology, linguistics, and neuroscience; and RePEc, a distributed archive of preprints in economics. More recent institutional archives in the UK are the Edinburgh Research Archive, Glasgow ePrints Service and the Open University Library's Eprints Archive.

The Budapest Open Access Initiative (BOAI)

Arising from a meeting convened in Budapest by the Open Society Institute in December 2001, the BOAI is an affirming statement of principle, a statement of commitment, and a statement of strategies designed to serve the interests of research, researchers, and the institutions and societies that support research. It was felt that existing separate initiatives could work together to achieve broader, deeper and faster success.

Although university vice-chancellors are unlikely to view the cost implications favourably,[8] libraries are ideally placed to provide the self-archiving servers and service, and it seems likely that such archives will become the part of the industry most susceptible to library influence. Undeniably, these archives are now a part of the e-resource industry; indeed, Research Councils UK and the Wellcome Trust have both mandated deposit in open access archives, and Ayris (2005)[9] reported that articles in open access archives are from two to five times more likely to be cited and read than those in subscription sources.

It follows that efficient information retrieval demands, in many cases, the searching of open access e-print archives, and the Institutional Archive Registry tracks the number and size of these archives. Similarly, OAIster is a project of the University of Michigan Digital Library Production Service which is creating a collection of freely available and previously difficult to access, academically-oriented digital resources that are easily searchable by anyone. It allows searching across archives, and includes the e-LIS: E-Prints in Library and Information Science archive.

E-theses

Open archive software is also used for another emerging format, e-theses. As researchers have become accustomed to having easy access to the fruits of research in e-journals, expectations have grown for access to the content of dissertations and theses. In an effort to facilitate greater access to, and use of, this huge body of academic research produced within universities – research that has remained largely 'invisible' – there has been a concerted move towards facilitating online provision of theses. Internationally, a significant number of universities have made their dissertations and theses available in digital form and have developed a range of open-source software packages to facilitate this. These developments have been influenced by such international initiatives as the Networked Digital Library of Theses and Dissertations (NDLTD), an international organization dedicated to promoting the adoption, creation, use, dissemination and preservation of electronic analogues to the traditional paper-based theses and dissertations, and the guidelines produced by UNESCO.

Since the inception of the UK University Theses Online Group in the mid 1990s, there have been significant moves towards addressing the issues associated with the establishment of a national service that will support the creation and management of e-theses in UK universities. In 2002, as part of the Focus on Access to Institutional Resources (FAIR) Programme, JISC funded three major initiatives: the Electronic Theses project led by the Robert Gordon University, the complementary Theses Alive! project at the University of Edinburgh, and the DAEDALUS project run by the University of Glasgow. The projects investigated a range of legal and management issues as well as the technological requirements, and the findings were complementary – there was agreement on the identification of a core set of metadata and also the preferred software for e-thesis repositories. Following dissemination sessions in 2004, 'Efforts are now being made to ensure that future work relating to e-theses in individual institutions, and in terms of

the creation of a national infrastructure, take into account the findings of [these] earlier projects'.[10] In addition to the universities that participated in the projects, several other British universities including Nottingham (currently the only university linked to the Institutional Archive Registry above) and the Open University (Digital Archive of Research Theses) are establishing repositories of e-theses.

All of these major initiatives, together with other institutions establishing e-theses collections and the British Library, have become part of a larger JISC project, Electronic Theses Online Service (EThOS), which commenced in 2005. The aim of the EThOS project, as the project homepage states, is 'to deliver a fully operational, easily scaleable and financially viable prototype UK online electronic theses service, and supporting infrastructure.' It will become a one-stop shop for students and academic staff permitting searching of a UK Database of Theses (UKDoT), which will be populated by harvesting software and, ultimately over some ten years, by the digitization of print theses. Unequivocally, this will be a significant addition to the array of e-resources to which libraries will have to facilitate access. The appearance of Charles Bailey's new bibliography on e-theses not only offers an important resource but also serves as an indication of the future status of this format.[11]

E-books

A major development during the past decade has been the advance made in e-book publishing. A study of the publishing of electronic scholarly monographs and textbooks conducted in 1998 by the authors of this chapter revealed an embryonic e-book industry in which there was uncertainty amongst academic book publishers as to the potential strength of the market. Nevertheless, a discernible positive attitude combined with a small but encouraging level of activity was also identified.[12] In part, the uncertainty was due to ambivalence about the emerging format among the ILS sector. The commercial sector was dominated by academic e-monographs, led internationally by the university presses, with some textbook and reference publishing, all predominantly in CD ROM format. This was complemented by the existence of a substantial body of free e-books made available through text archives such as Gutenberg, the Oxford Text Archive, and the Virginia Text Archive.

During the early years of the twenty-first century, e-book publishing both internationally and in the UK has made unprecedented progress. In the UK, this is due in part to the influence of the JISC E-Books Working Group, which has formulated a national strategy to develop a critical mass of e-book titles for the tertiary sector, and to facilitate the uptake of material within academic institutions.

Within academic monograph publishing there has been a move from university presses to commercial academic and educational publishers, and with this, an embracing of the FE sector. John Thompson[13] offers a convincing argument as to why reference works lend themselves to online delivery, and thus it is no surprise that there has been a substantial growth in the publishing of e-reference materials. One important manifestation has been the emergence of e-reference collections such as Oxford Reference Online, and XreferPlus, which facilitate access to sizeable multidiscipline collections with sophisticated search facilities. Whilst an early prediction of the predominance of digital textbooks has not been realized[14], largely as a result of research and development undertaken by the E-Books Working Group, the sector is witnessing an increase in the publication of e-textbooks in the UK, a priority for many librarians. With the move towards broadening the base of publishing for the FE sector has come a complementary increase in the publishing of the various forms of e-books for the schools sector, which serves to reinforce the status of the format.

Another hugely significant manifestation in the field of e-book publishing has been the emergence of aggregators such as OCLC NetLibrary, Questia, and Ebook Library, which offer access to substantial collections of international e-book titles, comprehensive searching facilities and, in some cases, access to an array of e-reference tools to support the user's exploitation of the collection. Aggregators tend to use a library model in which the library's users can borrow books virtually, and they offer a variety of subscription-based licensing models (EBL's approach differs from the others). While subscription is the norm for e-books, one publisher, Thomson Gale, offers titles for purchase.

With an increase in the incidence of publishing have come changes in the format, most significantly the decline of CD ROMs. For the most part, e-book publishing has been concerned to digitize existing

print-based titles. However, there is a small but noteworthy body of titles emerging which are born digital. Some of these emanate from commercial publishers while others have been developed as the result of research projects. One of the most impressive examples of this is *City Sites: Multimedia essays on New York and Chicago, 1870s–1930s* which was a collaborative venture between scholars in the USA and Europe, funded by the AHRC, and based at the universities of Birmingham and Nottingham. Born-digital titles do tend to offer a greater range of functionality, and in the example cited above, the creators of *City Sites* are exploring the use of non-linearity, which is likely to be developed further in the next generation of e-books.

A sense of the continuing importance of e-books to libraries can be gained from a 2004 Electronic Publishing Services report, which predicted that: 'By 2009 the percentage of UK book output available in electronic form will rise to nearly one third, mostly in parallel e- and print forms…By 2020 the percentage…will rise to over 80% [and] 39 per cent of output will be *only* available in electronic form.'[15]

Geospatial e-resources

The E-Books Working Group is only one of six collection groups run by the JISC, and another field that has seen significant growth over recent years and has been promoted by another working group is geospatial materials. Resources cover a variety of disciplines and are predominantly web-based. The range extends from maps, sometimes backed by a gazetteer service to textual resources including place names and postcodes. A major initiative has been the e-MapScholar project which is concerned with the formulation of teaching and learning materials to support geospatial data use within further and higher education. Digital map data and data available from EDINA's Digimap service, which includes online maps, the Landmark historic map collection and other mapping data of Great Britain, is included in the range of material.

The development of the recent gateway Go-Geo! on EDINA is likely to prove an important stimulus to promoting access to these formats. The gateway has been created to locate details about geospatial data sets and related resources within British tertiary education, covering both research and learning materials. Another is the recent decision to make the North American Geospatial Electronic Records web site, run by the Center for International Earth Science Information Network of Columbia University, a portal to resources on managing and preserving geospatial data. This site also contains a Guide to Managing Geospatial Electronic Records, as well as other important resources. Within the UK, the importance accorded to geospatial materials is underlined by the creation of a working group within the JISC which is working to ensure that a critical mass of high quality material is created and easily accessed by students and researchers.

Outside the educational sector, one cannot ignore advances such as Google Maps and Google Maps Transparencies , which serve to reinforce awareness and expectations of the format.

Multimedia and moving image e-resources

In the arena of moving pictures and sound – amongst the most established and dynamic e-formats within the industry – there have been several important new initiatives. One new service is the Moving Image Gateway (MIG) which has been developed by the British Universities Film and Video Council (BUFVC). MIG collects together web sites that relate to moving images and sound, and their use in tertiary education. The nature of this service is summarized in the following extract from the BUFVC web site:

'The sites are classified by academic discipline, some forty subjects from Agriculture to Women's Studies, collected within the four main categories of Arts & Humanities, Bio-Medical, Social Sciences and Science & Technology. Each site has been evaluated and described by the BUFVC's Information Service, which regularly checks and updates the database. Sites are highlighted which have video or audio streaming. There are currently some 600 sites on the MIG database, and it is anticipated that it will develop at the rate of ten per month.'

Another recent initiative is Education Media OnLine (EMOL) which is funded by the JISC. EMOL comprises a set of 15 collections of film and video, hosted by EDINA and cleared and digitized through the JISC's Managing Agent and Advisory Service (MAAS), which is also producing associated metadata. The work, which is ongoing, 'will result in hundreds of hours of material becoming available. The films are of high quality, and are fully downloadable, either in full or as segments, and can be used freely in learning, teaching and research'. At present the service is freely available until 2007.

A service that links moving image and sound with another established e-resource, images, is the Scottish Cultural Resources Access Network (SCRAN). Now part of Scran Trust, a UK charity, the service offers 'an extensive educational image archive and an easy environment for creating and sharing learning resources onsite and online'. Access is facilitated to over 300,000 copyright-cleared images and text, clip art, video-clips, and sound files across a wide range of subject and curricular areas. In keeping with the national movement to digitize our national cultural and historical heritage, this material, taken from museums, galleries and archives as well as the media, seeks to promote the history and culture of Scotland, and to facilitate uptake in tertiary education. Subscription to the service is currently available through the JISC.

The growing use of images within education and research is reflected in the number of institutional collections of images which have been established in the UK. One service which fosters the provision of images is The British Library online image collection. Although it is directed at the commercial image market such as publishers and media researchers, it has a contribution to play in tertiary education where there is an increasing demand for images to integrate into print material, learning and teaching material and within the virtual learning environments (VLEs). The service was launched in February 2003, and reflects the depth of the British Library's collections.

Other examples of collections are the Image Sites collection established by the Technical Advisory Service for Images (TASI) which affords details of a wide range of digital image collections, and projects and image collections made available by AHDS Visual Arts and EDINA's Education Image Gallery which offers over 47,000 images in a diverse range of subject fields.

Emerging types of e-resource

Finally, it is appropriate to include four emerging e-resource types which offer innovative approaches to information handling, and which have considerable potential for libraries. Blogs arrived on the scene as online diaries and, probably due to the immense silliness of many of them, have been collectively castigated as a waste of web space by normally respected writers such as Gorman[16] and Cronin.[17] Their intemperate tones raised a fire-fight of response, with one of the most reasoned suggesting:

> 'Blogs are definitely not G-d's gift to libraries, and I don't think that librarians should 'worry' about blogs. I think that librarians should embrace blogs if they feel that they will help their library… So, maybe [previous writer] is right: not everyone should worry about them. But at the very least they should know what blogs are and how they can possibly improve the way libraries/librarians communicate with their staff and patrons.'[18]

The most obvious potential for blogs in the library is as a useful way of providing information to users or staff and, as such, a discussion of e-resources would be incomplete without some mention of them.

RSS feeds can be a boon to librarians faced with a need to manage too much information in too little time. RSS stands for 'Really Simple Syndication' or 'Rich Site Summary' (take your choice) and, in essence, selected feeds send news items to a piece of software on the librarian's computer known as a feed-reader – some journals provide tables of contents in this way, nearly all major newspapers and news sources provide news and industry news, and some important web sites use them to let users know when they have added information. There is no longer a need to go and find information, it is sent automatically once the feed has been selected in the feed-reader. A degree of circumspection is necessary or the feed-reader will contribute to information overload, but RSS removes e-mails from overused inboxes and brings together 'like' content; the software offers an easy 'headline' scan facility and it is possible to decide how frequently updates from each feed are harvested. Not only do feeds provide information but, like blogs, RSS feeds can also be used by libraries as an easy means of publicizing activities and library news.

Wikis – editable web sites – have been with us for a few years as well, and are probably best known for the Wikipedia project. It seems likely that they, alongside blogs and RSS, will have a significant impact on libraries in the next decade. Wikis are a useful tool for facilitating online education, or for the creation and delivery of user-generated documentation; work groups and teams can use blogs and wikis to report progress to each other.

Shared bookmarking – or 'social classification' or 'folksonomies' – also offers libraries a new tool, although, almost by definition, they are possibly of more use to personal users. Examples are Spurl, del.icio.us, de.lirio.us, and Connotea. Some, like Connotea, are targeted at the 'scholarly user'. The essential concept of each is the creation of a central resource by its users: each allows users to store bookmarks online, share them with the world at large or mark them as private, and to categorize them (place them in folders). The idea of social classification comes from users tagging items with a few keywords so as to enable easy retrieval and the grouping together of similar items. Some sites also allow users to set up RSS feeds to alert them when new items are added with a particular keyword.[19]

The problem of e-resource definition

Although we, as chapter authors, have tried to cover all the major types of e-resource, albeit briefly, there are of course others, not so far examined, perhaps most notably the web site, which transcends categorization. The term 'web site' may encompass several of the e-formats discussed above, as well as discrete forms such as the company web site, the university web site or a media site such as the BBC. Web sites are also manifest as portals and gateways. The JISC, through its eLib programme of research and development, stimulated the creation of a number of subject gateways; among the best known are SOSIG (social sciences), EEVL (engineering) and OMNI (health, medicine and life sciences), now all part of the Resource Discovery Network, but many other subject gateways and portals exist. A gateway is an e-resource that brings together a number of evaluated and assessed resources in a single subject area, possibly through a searchable catalogue or directory, while a portal allows searching across the collection resources themselves from a single interface. Gateways and portals are typically free; and they do not all include only evaluated material, in the JISC tradition. A useful resource to identify subject gateways is Pinakes – a gateway to gateways.

Learning materials also cut across many of the resource types described above, and many are purely for in-house use; grey literature has also not been addressed for similar reasons, although it is forecast that the present trend towards web publishing of conference proceedings and report literature is likely to eradicate print by 2014[20]. Finally, some resources defy categorization into our neat taxonomy by virtue of their make-up! LexisNexis, for example, is described as both database and information service; it is an aggregator of material including both e-journals and e-books but could not be described as an e-journal collection because most journals are not cover-to-cover replications of print journals; and it contains both full-text material and bibliographic references. Similarly, Factiva from Dow Jones and Reuters brings together content from newspapers, newswires, broadcast media, trade magazines and journals in one service. However, this chapter does not set out to offer comprehensive coverage of resources, and this example is included only to illustrate the difficulty of e-resource categorization, and to support the editors' topical approach.

Issues in library provision

The availability of this range of resources is only one consideration for librarians; the problems of locating and acquiring appropriate products, as well as the many issues surrounding the management of a collection of e-resources, should not, and indeed cannot, be ignored. Some of these will be addressed in greater detail in later chapters of this e-book, so at this point we shall only highlight some of the most important issues.

While the discovery tools for conventional, paper-based resources have been long established, those for e-resources are still in their infancy, leaving the profession to determine what is available as best it can. In

a recent survey relating solely to e-books, it was evident that there is no one single source and that a range of disparate bibliographic sources and services needs to be used. It was sobering that in the discovery of e-book titles the informal and serendipitous played such a significant role.[21]

Bibliographic control of e-resources began with a number of attempts in the late 1970s and 1980s to facilitate control over non-book publications. Later, the Voluntary Deposit of Electronic Publications (VDEP) was established as a two-year pilot project in January 2000, and was concerned with hand-held media only. This resulted in several hundred CD ROMs being deposited voluntarily in the British Library. Following this ad hoc inclusion of certain e-formats in the British National Bibliography, UK legislation on legal deposit received Royal Assent in October 2003 (Legal Deposit Libraries Act 2003 [c.28]). The Act, which comes into force in 2006, extends previous legislation from print materials to accommodate CD ROMs and selective harvesting of web sites with a dot-uk suffix. It is, however, only 'enabling' legislation, and individual types of e-resource must be included through secondary legislation as it is seen to become necessary. Ultimately, this may lead to the establishment of a national bibliographical source for publications such as e-journals or e-books, but it is clear that this will provide no early panacea for librarians searching for new material in the first decades of the century.

There is an apparent need for granularity for some primary e-formats (e.g. chapters within e-books) and this presents another dimension to the issue of discovery and access. The work being undertaken in the field of digital object identifiers (DOIs) – names assigned to any entity for use on digital networks – has the capacity to address this, and the International DOI Foundation offers a full account of current developments on their web site.

The Open Archives Initiative provides one possible response to resource discovery through metadata harvesting, which allows metadata to be copied for use in another service. 'Open' does not suggest that the full-text article will be freely available but rather that, for licensed copyright material, the metadata will be freely available while the full text remains subject to licensed access control. Clearly, metadata application and standards such as the Dublin Core or the UK Learning Object Metadata Core are a crucial aspect of e-resources.

Possibly one of the most complex and fraught areas of e-resource management is licensing. Despite attempts to provide standard or model licences (in academia, the JISC has three: one for e-books, the NESLi2 model for e-journals, and one for data sets), it is easy to fall foul of terms and restrictions. Librarians need to take especial care in defining both the rights specified by licences and who their institutional user groups are. For instance, librarians need to be clear that the terms and conditions of each licence will allow users to download or print material and indeed whether the licence includes walk-in users and/or distance learners.

Having acquired or licensed e-resources, it is necessary to ensure that they are utilized fully, and promotion to all categories of user is of paramount importance, as the JUSTEIS project demonstrated. The project examined the ILS web sites of the majority of universities in the UK, and each listed the range of materials that staff and students might use; usage statistics made it clear that simply listing was insufficient and that proactive promotion to all sectors is necessary. Adding e-resources to the catalogue so that they are accessible via the OPAC seems an appropriate strategy but this, in turn, raises problems such as password management and the blocking of OPAC terminals by users reading full-text articles. There has even been debate on the relative merits of a single record embracing both e- and paper versions, and parallel records.

It may be that such concerns are artificial in a climate which embraces the JISC Information Environment and in which students expect resources to be delivered to them. Anecdotal evidence suggests that students expect to be told about the information resources they are expected to use and have even complained formally when this was not done and they were left to search. Virtual learning environments also tend to hamper this aspect of the need for students to take control of their own learning: a far cry from the information literacy promoted by bodies such as SCONUL and CILIP. Given the implications of the JUSTEIS findings, in addition to the role played by information literacy programmes, it is crucial that libraries establish strategies for promoting e-resources. In a series of workshops held by the authors, librarians reported promotional activities including staff training programmes, staff information sessions, newsletters, T-shirts, posters and exhibitions, daily bulletins, in-house TV, new user orientation, workshops,

web/intranet messages and mailing list servers, and e-book days. Where there are national or pan-institutional bodies such as the JISC, the M25 consortium or the People's Network, it is clearly desirable for a wider promotional strategy to be utilized.

The success of such strategies requires monitoring, and evaluation of both use and customer satisfaction is required. Raw statistics may be gathered from local management software and VLEs or – particularly in the wake of the COUNTER project's standardization of statistics – from publishers, but it should be borne in mind that qualitative statistics must also be gathered. Often, quantitative data does not distinguish between momentary visits to a resource (browsing) and in-depth study. Few user satisfaction studies have been undertaken to determine the efficacy of e-resources.

Thorough monitoring of use might include the gathering of statistics for different categories of user, matching usage against potential usage, questionnaires to evaluate outcomes, the testing of citings in academic bibliographies, and measuring failed accesses and turnaways.

The issues articulated here may change, or indeed increase in number, as the number of e-resource types grows and their characteristics change. It seems appropriate to conclude this opening chapter with a view of the possible trends in this area.

The future

The body of this chapter has described the e-resource industry as it is found and used by librarians in the first decade of the twenty-first century. Computer and communications technologies do not remain static for long and, as storage and processing speed improve, it becomes possible to imagine new and better content products. You only have to look at the number of new approaches offered by Google in 2005 to confirm this – Google Maps and Google Earth alone offer users the type of display on their desktops hitherto reserved for television spy thrillers! It is almost impossible to speculate on the range of valuable information sources that will arrive in any 12-month period! Graphic weather stations and satellite imagery on the desktop are commonplace; in the van of RSS, it seems certain that more automatically delivered information forms will become available; interactivity seems equally certain. Wireless technology has both good and bad aspects for libraries, and software that can transform a digital video camera (or mobile phone) into a bar-code scanner, and enable users to create a digital library of all their books, CDs and movies, complete with cover images and liner notes, has also been forecast.[22]

The 2004 report for the British Library on e-publishing in the first 20 years of the century noted that 'considerable uncertainty exists about what will constitute a publication in the latter part of the period covered – say from 2014. Discrete units of content corresponding more closely to chapters or articles than to monographs or serials will be available'[23]. Granularity is particularly an issue for schools, especially in the secondary sector where there is a growing awareness of the need for cross-sectoral e-resource provision – an issue which is embedded in national education reports, such as that dealing with the 14–19 agenda[24] and one that commercial e-publishers are beginning to address.

Another issue of some concern is the increasing move towards convergence – not the least because the JISC Information Environment approach tends to mask, or at least downplay, the importance of the original source of information. A recent OCLC report noted that 'content consumers are format-agnostic'[25] and in a personal conversation the Corporate Vice President of OCLC's NetLibrary said that 'in 10 years, there will be no e-books, only e-content'. If this is to suggest that it is of no concern to users whether the factoid presented comes from a scholarly journal, an e-book or a commercial web site, it seems clear that one arena in which librarians have a major role to play is that of information literacy. Fortunately, it is evident that librarians realize this, and information skills and skilling associated with e-resources are now being addressed. Considerable emphasis is now being placed on information literacy within the tertiary sector. However, it is important that the transfer of information skilling is also acknowledged. For example, a study on the role of university libraries in familiarizing school pupils with e-resources indicates the potential for collaboration with the secondary schools sector[26] and the CILIP Information Literacy Group has a remit to promote information literacy across all sectors.

At a recent UKeiG meeting[27] it was suggested that librarians should play a greater role in the strategic development of search engines – perhaps in the same way that the JISC has involved them with e-books. If trends can be discerned within the e-resource industry, they are the primacy of search engine initiatives, moves towards 'informal' formats (blogs, wikis, folksonomies), interactivity, and a blurring of the sometimes subtle differences between e-resource types. These trends will result in a diminution of quality, and consequently they highlight the important role of ILS workers – as key players in resource design as well as promoters of information literacy.

Web sites of organizations included

Vatican Project
http://bav.vatican.va/en/v_bav/bav.shtml

Oxford digitization projects
http://www.bodley.ox.ac.uk/dept/scwmss/wmss/medieval/browse.htm
http://image.ox.ac.uk/

Gathering of the Jewels
http://www.gtj.org.uk/

JISC e-Framework for Education and Research
http://www.e-framework.org/

JISC e-Learning Framework
http://www.jisc.ac.uk/index.cfm?name=elearning_framework

JISC Virtual Research Environment Programme
http://www.jisc.ac.uk/programme_vre.html

e-Science programme
http://www.rcuk.ac.uk/escience/

BL Direct
http://direct.bl.uk/bld/Home.do

InforM25
http://www.m25lib.ac.uk/

The European Library
http://www.theeuropeanlibrary.org/portal/index.htm

Directory of Open Access Journals
http://www.doaj.org/

Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH)
http://www.openarchives.org/

BOAI
http://www.soros.org/openaccess/index.shtml

Institutional Archive Registry
http://archives.eprints.org/index.php

OAIster
http://oaister.umdl.umich.edu/o/oaister/

UNESCO
http://portal.unesco.org/ci/en/ev.php-URL_ID=3037&URL_DO=DO_TOPIC&URL_SECTION=201.html

Focus on Access to Institutional Resources (FAIR) Programme
http://www.jisc.ac.uk/index.cfm?name=programme_fair

Electronic Theses
http://www2.rgu.ac.uk/library/e-theses.htm

Theses Alive!
http://www.thesesalive.ac.uk

DAEDALUS
http://www.lib.gla.ac.uk/daedalus/

EThOS
http://www.ethos.ac.uk/

JISC E-Books Working Group
http://www.jisc.ac.uk/index.cfm?name=wg_ebooks_home

OCLC NetLibrary
http://www.netlibrary.com/

Questia
http://www.questia.com/

Ebook Library
http://www.dawsonbooks.co.uk/services/e-books.html

Thomson Gale
http://www.gale.com/eBooks

City Sites:Multimedia essays on New York and Chicago, 1870s–1930s
http://artsweb.bham.ac.uk/citysites/

Center for International Earth Science Information Network of Columbia University
http://www.ciesin.columbia.edu/ger/

Google Maps Transparencies
http://www.kokogiak.com/gmaps-transparencies.html

Moving Image Gateway (MIG)
http://www.bufvc.ac.uk/gateway/index.html

British Universities Film and Video Council (BUFVC)
http://www.bufvc.ac.uk/index.html

Education Media OnLine (EMOL)
http://www.emol.ac.uk/description.shtml

Scottish Cultural Resources Access Network (SCRAN)
http://www.scran.ac.uk/

The British Library online image collection
http://www.imagesonline.bl.uk/britishlibrary/

Technical Advisory Service for Images (TASI)
http://www.tasi.ac.uk/index.html

AHDS Visual Arts
http://vads.ahds.ac.uk/collections/

EDINA's Education Image Gallery
http://edina.ac.uk/eig/

Wikipedia
http://en.wikipedia.org/wiki/Main_Page

Spurl
http://www.spurl.net/

del.icio.us
http://del.icio.us/

de.lirio.us
http://de.lirio.us/

Connotea
http://www.connotea.org/

Resource Discovery Network (RDN)
http://www.rdn.ac.uk

Pinakes
http://www.hw.ac.uk/libWWW/irn/pinakes/pinakes.html

International DOI Foundation
http://www.doi.org/

COUNTER
http://www.projectcounter.org/

CILIP
http://www.cilip.org.uk/professionalguidance/informationliteracy

References

1. Kidd, T. and Rees-Jones, L. (Editors), *The Serials Management Handbook: a practical guide to print and electronic serials management*, 2000, Library Association Publishing, London. 1-85604-355-X

2. DfES, *Harnessing Technology: Transforming Learning and Children's Services*, 2005, London, DfES. Available at: http://www.dfes.gov.uk/publications/e-strategy/docs/e-strategy.pdf [7 February 2006]

3. JISC Focus on Access to Institutional Resources (FAIR) Programme. Available at: http://www.jisc.ac.uk/index.cfm?name=programme_fair [7 February 2006]

4. Chillingworth, M., British Library has Digital Vision. *Information World Review*, 2005, 215, 1.

5. Urquhart, C.J. *et al.*, *JISC User Behaviour Monitoring and Evaluation Framework. JUSTEIS: JISC Usage Surveys: Trends in Electronic Information Services. Strand A: Survey of end users of all electronic information services (HE and FE), with Action Research report; Strand C: Electronic information service provision by library and information services websites (HE and FE). Final report – 2002/2003 cycle 4 report.* Aberystwyth: University of Wales, Aberystwyth and Information Automation Limited.
    http://www.justeis.info/ [7 February 2006]

6. Powell, D.J., *Publishing output to 2020. [Report to] The British Library 29 January 2004.* London: EPS. Available at: http://www.bl.uk/about/articles/pdf/epsreport.pdf [7 February 2006]

7. Ayris, P., Evolution and Engagement: the landscape for Arts and Humanities in a digital age. Presentation at Open Access Debate: what is the future of scholarly communication? St Peter's College, Oxford on Tuesday 21 June 2005. Available at:
    http://www.ucrg.org.uk/contact/branches/bbo/events/openaccess.html [7 February 2006]

8. MacColl, J. *et al.*, Developing an agenda for institutional e-print archives: Report on a meeting at Institute of Mechanical Engineers, London. *Ariadne,* 2001, 29. Available at:
    http://www.ariadne.ac.uk/issue29/open-archives/ [7 February 2006]

9. Ayris, P., *Op.cit.*

10. Copeland, S., Penman, A. and Milne, R., Electronic theses: the turning point. *Program,* 2005, 39 (3) 185–197.

11. Bailey, C., 2005. *Electronic theses and dissertations: a bibliography.* Available at:
    http://www.escholarlypub.com/digitalkoans/2005/07/08/electronic-theses-and-dissertations-a-bibliography/
    [7 February 2006]

12. Armstrong, C.J. and Lonsdale, R.E*., The publishing of electronic scholarly monographs and textbooks*, 1998. Report G5.
    London: Library Information Technology Centre. Available at:
    http://www.ukoln.ac.uk/models/studies/ [7 February 2006]

13. Thompson, J.B., *Books in the digital age: the transformation of academic and higher education publishing in Britain and the United States*, 2005, 323–4, Cambridge: Polity Press.

14. *Ibid*, 377–9.

15. Powell, D.J., *Op.cit*.

16. Gorman, M., Revenge of the Blog People! *Library Journal*, 2005, February 15.

17. Cronin, B., Dean's Notes: BLOG: see also Bathetically Ludicrous Online Gibberish. *SLIS News*. (27 April 2005)
    Available at:
    http://www.slis.indiana.edu/news/story.php?story_id=958 [7 February 2006]

18. Cohen, S., Internet Anxiety Disorder. In: *Library Stuff,* 2005, April 25.
    http://www.librarystuff.net/2005/04/internet-anxiety-disorder.html [7 February 2006]

19 Armstrong, C., Outguessing yourself! *eLucidate,* 2005, 2 (3) 6–7.

20. Powell, D.J., *Op.cit.*

21. Armstrong, C., Edwards, L. and Lonsdale, R., Virtually there: e-books in UK academic libraries. *Program*, 2002,
    36 (4) 216–227.

22. Shlain, T., *Webby trends 2005*. The Creative Group. Available at:
    http://www.webbyawards.com/Webby_Trends_2005.pdf [7 February 2006]

23. Powell, D.J., *Op.cit*.

24. DfES (2002) 14–19: Extending opportunities, raising standards: Consultation document. London: DfES. Available at:
    http://www.dfes.gov.uk/consultations/conResults.cfm?consultationId=1207 [7 February 2006]

25. OCLC (2004) 2004 Information Format Trends: Content, Not Containers. Dublin, OH: OCLC. Available at:
    http://www.oclc.org/reports/2004format.htm [7 February 2006]

26. Lonsdale, R. and Armstrong, C., Crossing the Educational Divide: Issues surrounding the provision and use of
    electronic resources in secondary and tertiary education. *Synergy,* 2004, 2 (2) 24–32.

27. UKeiG – the UK eInformation Group, a Special Interest Group of CILIP, the Chartered Institute of Library and
    Information Professionals – open debate at the meeting, 'Defining the Digital Road Map: Future directions for
    the e-information profession' held in London, 21ˢᵗ June 2005.

Article © Chris Armstrong and Ray Lonsdale

■ **Chris Armstrong**
E-mail: lisqual@cix.co.uk
Tel: +44 (0)1974 251302
Web site: http://www.i-a-l.co.uk
Blog: http://i-a-l.blogspot.com/

Correspondence address:
Information Automation Limited
Penbryn, Bronant
Aberystwyth SY23 4TJ, UK

■ **Ray Lonsdale**
E-mail: rel@aber.ac.uk
Tel: +44 (0)1970 622173

Correspondence address:
Department of Information Studies
University of Wales, Aberystwyth
Llanbadarn Fawr
Aberystwyth SY23 3AS, UK

Biographical notes

Chris Armstrong is Managing Director of Information Automation Limited (IAL), a consultancy, research and training company in the library and information management sector which was established in 1987. IAL's work focuses on electronic information resources, and their effective use in libraries and information centres. In recent years, e-books have been the subject of much of the company's research and training. Chris also teaches at the Department of Information Studies in Aberystwyth where he is Module Co-ordinator for a course on electronic publishing.

Chris publishes, and speaks at conferences regularly. He is a Fellow of both the Institute of Analysts and Programmers (FIAP), and of CILIP: the Chartered Institute of Library and Information Professionals (FCLIP). He is currently a National Councillor of the latter and Vice-Chair of the UKeiG: the UK eInformation Group – a CILIP Special Interest Group that focuses on the accessibility, use and management of electronic information.

Ray Lonsdale is Reader in Information Studies and is responsible for teaching and research in the fields of collection management, research methodology and children's librarianship. He has been involved in many funded research projects and was co-director of the five-year JUSTEIS project for the JISC which investigated the provision and use of e-resources in further and higher education. He has been a member of the JISC E-Books Working Group since its inception in 2000, and has co-directed several research projects in this field with Chris Armstrong.

He is the author of numerous articles, co-authored *Focus on the Child: Libraries , Literacy and Learning* with Professor Judith Elkin, and was Editor of *The International Review of Children's Literature and Libraries*, *Youth Library Review* and, most recently, *The School Librarian*. He is currently co-authoring a new book: *e-Books in Libraries: Provision, Promotion and Use* (Facet Publishing) with Chris Armstrong, to be published in 2006. For the past 20 years he has been a consultant working internationally, most recently in South Africa where he has run workshops on e-resource provision and in Palestine where he led the work on the establishment of the Qattan Centre for the Child in Gaza City.

To view more chapters from *The E-Resources Management Handbook*, published by UKSG, click here:

http://www.uksg.org/serials/handbook.asp