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Developing and evaluating an electronic 'short loan' collection in a university library

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ABSTRACT

The issues involved in developing and evaluating an electronic 'short loan' collection of high-demand articles are discussed with reference to the experience of Project ACORN (Access to Course Readings via Networks), an eLib (Electronic Libraries) project. The project gathered information on the traditional short loan collection as a point of comparison with the electronic service, and on the attitudes of academic staff to the traditional collection. Findings indicated the need for close liaison with academic staff to identify items for an electronic collection, and the need to recognise the wide range of students' IT skills and abilities when planning training. Users' experiences of the traditional short loan collection confirmed that an electronic service could overcome some of the difficulties. Statistics on the size and scope of Loughborough and Leicester universities' short loan collections indicated that an electronic service is unlikely to replace the traditional service. The project's experience with gaining copyright permissions from publisher's shows that the timescales required for clearance and the uncertainty posed by refusals and differing scales of charges make it difficult for a library to plan for this type of service. Digitisation proved to be costly and the project only managed to convert 50% of its material to text files, the other 50% remaining as image files. The electronic system developed to deliver articles to end-users was designed to interact with the TalisWeb OPAC, and it proved reliable in operation. The system provides for detailed tracking of usage and the provision of detailed reports on usage to publishers. Experiences of training users are described and the need for hands-on practice is emphasised. Finally users' experiences of the system are briefly outlined, both positive and negative, and some usage data is presented. The conclusion points to the electronic service providing added value for users, but draws attention to the difficulties of copyright clearance, the costs of digitisation and the difficulty of timescales for identifying and making material available electronically.

Introduction

There are a number of initiatives in academic libraries in the United Kingdom to develop electronic 'short loan' or reserve collections of high-demand undergraduate readings. Project ACORN (Access to Course Readings via Networks) is one of a number of such projects funded through the eLib1 (Electronic Libraries) Programme in the United Kingdom. The whole programme is funded by the JISC (Joint Information Systems Committee) which is a sub-committee established by the Higher Education Funding Councils, through which the UK government funds higher education.

Project ACORN has set up electronic access to high-demand journal articles recommended by academic staff as core readings on undergraduate courses. The project is a partnership between Loughborough University, Swets & Zeitlinger B.V and Leicester University Library. The Pilkington Library at Loughborough University is the lead partner, and Computing Services and the Department of Information and Library Studies at Loughborough are also closely involved. The unique features of this project, as distinct from others in eLib's short loan strand, are the involvement of Swets & Zeitlinger as agents for the copyright clearance and digitisation processes and the project's sole focus on journal articles.

The project's aims are:-

- To develop a transferable model of the process of establishing and managing an electronic short loan collection
- To demonstrate the role of a third party agent in copyright clearance and digitisation
- To link the electronic articles to the Pilkington Library's TalisWeb OPAC
- To develop an online demonstrator system
- To monitor user reactions to the electronic texts and assess their use and usability
- To assess library procedures for managing the electronic delivery of course materials
- To test the portability of the model at Leicester University

Evaluation forms a very important part of the work of eLib's experimental and developmental projects, and each project has been encouraged to develop an evaluation strategy which will enable the implications of new electronic services to be carefully assessed. Project ACORN has both developed and piloted an electronic 'short loan' service as well as undertaking a number of evaluation activities. These developments are outlined and their implications discussed below.

Evaluating the traditional short loan service: a survey of academic staff views

In the autumn of 1996 a questionnaire survey of academic staff 2 in the three departments at Loughborough with which the project is working (Geography, Human Sciences and Information and Library Studies) was undertaken. Its aim was to provide the project with information on the views and behaviour of lecturers with regard to the current paper-based system of reading lists and the traditional short loan collection at Loughborough University, in order to provide a baseline of information with which an electronic service could be compared. Sixty-six staffs were contacted and 31 replied - a response rate of 47%.

Preparing and Updating of Reading Lists

Fifty-four per cent of respondents indicated that they prepare and update their reading lists immediately before the course starts, or on an on-going basis during the course. This leads to problems for the library in making resources available to students in time. Modularisation, a relatively recent development at Loughborough University, appears to have increased the number and frequency of reading lists produced, increasing the difficulty for the library of keeping track of them. It is clear that library and academic staff need to work more closely together to identify high-demand items well in advance where possible. This is even more crucial for an electronic service where lead-in times are greater because of the need to gain copyright permission and to make digital copies.

Perceptions of the role of reading lists in student learning

Guidance to quality texts and access to current literature were the two main roles ascribed to reading lists, although the practice of providing a structured programme of learning for students and the linking of reading lists to individual lectures were indicated. This latter development implies that lecturers are producing their reading lists as part of a wider process of providing students with course notes and information. Linking reading lists to weekly lectures means that more reading lists are being produced at shorter notice, contributing to the library's difficulties in meeting students' needs.

Grouping of items on reading lists

Lecturers indicated that they mainly group items on their reading lists according to subject, and more rarely according to whether they are core or additional reading. Copies of reading lists sent to the library are often annotated to indicate material for short loan, but students may not have this information on their copy. In the context of an electronic service it seems highly desirable to indicate on the reading list which items are available in full-text electronically.

Expectations of student use of reading lists

Respondents indicated that they expected students to use their reading lists primarily for coursework, including examinations, essays, project work and seminars, but wider and preliminary reading were also indicated.

Sending reading lists to the library

Ten per cent of respondents acknowledged that they did not send their reading lists to the library and a further three per cent that they did not always send them. Reasons included lack of time, not remembering, and the lack of an easy (electronic) mechanism to facilitate this. It seems essential that academics and librarians work more closely together to explore ways of facilitating the sending and receiving of reading list information. As it appears that more reading lists are produced on a more

regular basis with the advent of modularisation, academics and librarians need to discuss the implications of this for resource provision, develop an understanding of the work patterns and constraints on each side, and work together to ensure that resources are made accessible to students in a timely manner.

Awareness of and information about the short loan collection

Forty-one per cent of respondents indicated that they did not have sufficient information on the process of putting items into the short loan collection. Comments revealed that the library's change of policy to one where held journal articles are not added to the short loan collection had caused consternation amongst academics. Many felt the collection was no longer fulfilling its purpose, and received conflicting information from librarians and students on the use or non-use of short loan items. Provision of short loan usage information to lecturers by the library would be a valuable service. The recently implemented TalisWeb OPAC reading list module will enable the library to provide more information for lecturers on the use of their reading list items, than has been possible to date.

Some respondents indicated that the arrangement of photocopies in the short loan collection was confusing (it is currently a mixture of filing by author of article and filing by the name of the member of academic staff recommending the article). One respondent asked that the library consider providing more Web-based information on its services, including policy and procedures for the short Joan collection. As will be seen from feedback on the electronic service, although there were some problems with accessing the service, students did not then seem to have problems in locating the article they wanted.

Lecturers' expectations of student use of the short loan collection

Lecturers perceive the main purpose of the short loan collection to be helping students meet course requirements, including assessed work, examinations, and seminar preparation. Two respondents thought that the collection was for wider and background reading, indicating a lack of understanding of its purpose, although, interestingly, some student users of the electronic service indicated that they were using it for this purpose.

Some lecturers indicated that they are providing access to resources from the department, and pointing students to information on the World Wide Web, sometimes in place of referring them to the short loan collection, where this is no longer seen as meeting the required needs. Clearly, the content of both the paper and electronic services is crucial in determining their value to users. Again, closer collaboration between academic staff and librarians would help ensure the most efficient and effective use of both print-based and electronic resources in meeting students' needs.

Lecturers' ability to comment on their students' IT literacy

The survey included questions on lecturers' perceptions of their students' IT literacy as this information was needed in order to ascertain the types and level of training users would need for the electronic service. Twenty-one per cent of lecturers indicated that they could not comment on the IT literacy of their students. This may reflect the nature of the courses taught by particular lecturers, but this could not be confirmed from the survey returns.

Lecturers' comments on their students' IT literacy

Lecturers were asked to rate their students' IT ability year by year on a scale of poor to good (with definitions attached to each rating for guidance). The resulting information showed that while there was a clear increase in students' IT ability during their time at Loughborough, the range of abilities was very wide across all years. An electronic "short loan" collection needs to take account of this and ensure that training materials and training sessions can appropriately meet a wide range of needs. The importance of awareness of the level of students' IT skills has also been indicated by another eLib project concerning on-demand publishing in the humanities.

Summary of implications for an electronic service

The need for much closer library liaison with academic staff on reading lists, and resource provision, and the need to encourage lecturers to identify items for an electronic service sooner than they currently do for the traditional service seems crucial for the success of an electronic service. The benefit of feedback on the usage of reading list items in general, as well as more detailed feedback which the electronic service can provide, may help closer collaboration and the more timely identification of items for the electronic service. Students' IT skills are also an issue for an electronic service, given the range of levels and abilities indicated, making carefully planned and targeted training essential to ensure access to and use of the service.

Evaluating the traditional short loan service: a survey of short loan collection users and non-users

A one-to-one structured interview survey of users was undertaken in November and December 1996 based on a short questionnaire. The short loan collection at Loughborough University consists of shelves of short loan items partitioned off from the main body of the library by entrance and exit barriers. Students browse the shelves to select their items and these are issued to them at the counter within the Short Loan Collection before exiting back into the main body of the library. User interviewing took place in the short loan collection over a period of three weeks between 2pm and 2.30pm when queues for returning and taking out material were generally at their longest. Excluding the pilot phase responses, 153 respondents were interviewed concerning 203 items in their possession.

We also decided to create a brief questionnaire for those who did not use the short loan collection to provide them with a means of indicating the factors which discouraged them from doing so. This was sent to students in the three departments with which we were working on the electronic service, by email and by distributing and collecting paper questionnaires at the beginning of two large lecture sessions.

Problems with the current short loan collection

Although 37% of users surveyed reported no difficulties with the short loan collection, a significant number of difficulties were reported both by users and by non-users. Indeed all 73 of the non-user respondents were reporting difficulties which deterred them from using the collection. These findings confirm the need to explore alternative methods of delivering high-demand 'short loan' material to students.

Inconvenient loan period

Getting items back on time was the thing that most users (38%) found problematic as did the same percentage of non-users. This feeling was confirmed by the number of renewals performed (22.64%) indicating users had not had the time to complete their reading, and also by users' assessments of the short loan period (58% found it too short and one-third found 2.30 pm an inconvenient return time).

Again, the biggest deterrent for non-users was the short loan period (50%), most of whom found it too short, but some of whom thought it too long. Those who found it too long were generally part-time students, or distance learners, who were unable to take out a book one day and return it the next. The short loan collection therefore, does not seem to meet the needs of these students at all. The electronic short loan collection, on the other hand, would overcome the difficulties presented by a loan period as users could concurrently access high-demand material at any time they were on campus. It would be particularly beneficial if the service could be extended to home users with network access.

Desire for increased access to materials

Twenty-three per cent of users stated that they were not allowed enough items from the short loan collection. At the same time, ten per cent of users found that items they required were frequently already reserved by other users. These two findings imply that there are not enough copies for the increased access that is obviously desired by students. This is confirmed by a small number of students who indicated that the content of the collection was inadequate. Forgetfulness on the part of students in returning books also compounds the access problem. Again, the electronic short loan collection would overcome access problems by allowing multi-user access 24 hours a day to high-demand materials.

Short loan collection in high demand

The second largest deterrent for non-users (41%) was that required items were often already out on loan. It may have been for this reason that 20% of non-users used alternative sources of information. Twenty per cent of non-users also stated that the items they required were often already reserved and six per cent thought that the queues were too long. These figures indicate the demand that the short loan collection is placed under: so much so that potential users have lost hope that the collection can adequately serve them.

Prohibitive fines

The fourth largest deterrent for non-users (31%) was the prospect of being fined for the late return of items. Again, although the largest proportion of users (53%) thought the short loan fines fair, a further 34% thought them too expensive. Of course, where high-demand items are loaned, there needs to be some form of deterrent for their late return. However, an improvement on the delivery of high-demand materials would be a system where the item never, effectively, leaves the shelf, but is still accessible to all those that need it, when they need it.

Problems with a Short Loan system

There are other problems with the short loan collection which may be specific to Loughborough University's short loan arrangement. For example, the necessity of bringing the barcode to collect an item previously reserved, or the problem of items being misfiled by users after browsing. The problem of missing items has also been noted by other Short Loan Collection managers. Such problems could also be overcome by the electronic short loan collection model.

Summary of implications for an electronic service

These findings confirm the need to explore alternative methods of making high-demand material available to students. It is thought that many of the difficulties expressed by users of the short loan collection could be overcome by an electronic short loan collection. An electronic service would allow all students on a module simultaneous access to their high-demand material, at any time they were on the Loughborough University campus (7 days a week, 24 hours a day). This would greatly assist part time users who would have greater access to their articles on campus and who could also print off copies for use at home. It would obviously be even more beneficial to part-time students if the service could be extended to include remote access from home. Currently 514 study bedrooms on campus have network access. If the further 4,500 study bedrooms are also networked in future, access to the service would also be increased for full-time students.

Evaluating the traditional short loan service: short loan collection statistics

Information was gathered on both Loughborough and Leicester university libraries' short loan collections, again to provide some baseline data against which the electronic service could be measured, and also to assist with the portability study at Leicester University. Similar research has also been undertaken by Jacobs at the University of Sussex.

The objectives of the short loan collection statistics gathering exercise were to gather information from, both, Loughborough University's Pilkington Library and Leicester University's Main Library on:

- Short loan arrangements and conditions of use
- Coverage and content of the short loan collections
- usage of the short loan collections
- Short loan collection management.

Short loan arrangements and conditions of use

There are many differences between Loughborough University and Leicester University which may have had an impact on the type of short loan collections each manages. Loughborough has fewer students than Leicester University in total, but has a higher proportion of undergraduates: 77% (7,706) compared to Leicester's 56% (6,870). Leicester's journals are borrowable whereas Loughborough's are not. These factors may have contributed to Loughborough's choice of an open-access short loan collection as opposed to Leicester's closed access arrangement. There are a number of variations between the short loan arrangements and usage conditions at the two universities in terms of loan periods and fines, both of which are significant elements of a short loan collection but the most significant difference is that of the open and closed access arrangement. This difference has the greatest impact on the management of each collection.

Coverage and content of the short loan collection

The number of books in each collection is similar: 6,500 at Loughborough and 5,000 at Leicester. However, Leicester houses far more photocopies with 8,800 compared to Loughborough's 5,500. The difference here is contributed to by Loughborough's policy not to hold any duplicate articles, or any articles from journals taken by the Library in their short loan collection. Differences in the methods of selecting items for short loan will also have influenced the content of each collection. Loughborough's collection is decided upon almost entirely by the academics, whereas at Leicester the Lending Librarian has far greater jurisdiction in the selection process. Despite the differences in selecting and housing the items, it can be surmised from the size of Loughborough and Leicester's Short Loan Collections that an average of 12,000-14,000 items each year are in such high-demand by students that special access arrangements are necessary for them. In Loughborough's case this represents one-

third of items placed on reading lists. This conclusion is supported by the heavy use of such collections as illustrated below.

Usage of the short loan collection

In the academic year 1994-5 Loughborough University's collection registered slightly more issues than Leicester University's with 127,500 issues compared to 103,200. This averages out at approximately 15.5 issues per undergraduate student per year across both institutions. Due to the different types of statistics available for each collection it was difficult to compare the proportion of photocopy to book usage at each institution. At Loughborough 12% of the total issues were photocopies. At Leicester 44% of the total number of different items issued were photocopies. These figures cannot be directly compared, but in either case it is clear that photocopied articles are in significant demand by students, if not as significant as book demand. Not surprisingly the patterns of usage at both Universities were very similar with peaks in October- December, March, and May, and troughs between June and September. Both universities are on a semester system. These peaks further confirm the need for short loan collections in that material is required at the same time by all students.

Managing the short loan collection

This was the area of greatest difference between Loughborough University and Leicester University because of the open and closed access arrangements at each University respectively, and the different book selection methods. Leicester added double the number of articles that Loughborough added during 1995-6. We calculated that Loughborough spent 207 staff hours adding their articles, whereas Leicester employs staff for 790 hours for this purpose. Because of their closed-access arrangement, Leicester spends 2,985 hours staffing the short loan counter between 9am to 5pm per annum. In comparison, Loughborough spends 1,947.5 hours staffing the counter, but utilises an additional 1,195 staff hours in reshelving, 450 hours in retrieving reserved items for users, per annum. This amounts to 3,799.5 hours per annum. If we then add the number of extra hours required to tidy the open access collection (c.100) and search for missing items (33) - tasks which Leicester has little need for - the total then comes to 3,932.5 hours per annum. Both collections require an annual 'weed' of items. Loughborough spends 40 hours each summer on this task while Leicester allocates approximately 50 hours. Depending on the type of Short Loan Collection, therefore, in the experience of Leicester and Loughborough University libraries it requires between 3,825 and 3,972.5 staff hours per annum to manage and run a Short Loan Collection. This represents a significant amount of staff time and cost, while not even taking direct costs into consideration.

Implications for an electronic service

The size and scale of the short loan collections described, even when considering journal articles alone, make it difficult to see how an electronic service could entirely replace the traditional one until digitisation costs come down and copyright clearance is simplified. The time and costs involved in an electronic service, including gaining permissions, paying publishers' charges, digitising articles, and providing the IT infrastructure to support such a service appear prohibitive. Rather, an electronic service at present appears to be a value-added one for which items have been carefully selected bearing in mind the need to provide access for large numbers of students. The initial impact of an electronic service on the staffing and costs of the traditional service is likely to be very small, whilst the costs of developing and running the electronic service itself are likely initially to add to overall costs.

Gaining copyright clearance

In Semester Two 1996-7, 99 undergraduate modules were running in the three departments at Loughborough University with which the Project was working: Human Sciences, Information and Library Studies and Geography. Fifty-seven reading lists had been submitted to the library for these modules in the previous academic year (1995-6). Project ACORN received 24 reading lists for inclusion on the ACORN service. The total number of students on these modules was 670, although some of them were registered on more than one module. The total number of module registrations was 958.

Academics requested 316 articles from 131 different journals via these lists. The date spread of the articles ranged from 1955 to 1997, however the majority of articles (62%) requested were from the period 1989 to 1995. Only 9 of the articles required (2%) were anywhere near current, i.e. from the last two years. Indeed a good proportion of the articles (110, or 35%) were dated prior to 1989. The average number of pages per article was 16, although they ranged from 1 to 68 pages. We calculated that 96% of the articles requested for the ACORN service were held at Loughborough University by virtue of subscription, and that, to the best of our knowledge, 15 (5%) of the 316 articles were written by academics at Loughborough University.

Eighty-four publishers were approached in total for between one and 37 articles - an average of 3.7 articles per publisher. The largest proportion of articles (68%) belonged to UK publishers. UK publishers represented 48% of the total number of publishers approached. The US represented 39% of the total, but for only 22% of the total number of articles. The remaining ten per cent of articles were split between the other 40% of publishers in Canada, Germany, Holland and South Africa.

The largest number of articles (72%) came from the largest group of publishers (59%): commercial publishers. Nineteen per cent of the articles belonged to learned publishers. Learned publishers represented 31% of the total number of publishers.

The smallest group of articles (7%) came from the smallest group of publishers: the University Presses (9.5%).

Overall, commercial publishers within the UK owned the copyright in the largest portion (52%) of the articles we were requesting permission for. Commercial publishers in the USA owned the copyright in 14% of them, closely followed by UK Learned Society Publishers who owned the copyright in 12% of them.

Fifty-eight (69%) of the 84 copyright holders approached agreed to participate, 92% of whom made no charge, and seven per cent made a charge which the project felt to be acceptable. We defined an acceptable charge as one which could be met from the project budget and which had been approved by the project's steering group. In practice this meant accepting all the suggested per page printing charges, for which the highest amount suggested was 12.5p per page. With regard to charges per page for mounting articles, the number of students on the module influenced our acceptance or rejection. Where student numbers were such that the cost of mounting the article could be judged as broadly comparable with the costs per page printed outlined above, if all students were to print off a copy, we accepted the charge. If not, we rejected it. However, it must be emphasised that our aim was to provide access to as much material as possible in order to encourage student usage of the service. We did not pass charges on to students, for this reason, but relied on organising a seminar for our participating publishers to ascertain the factors to be taken into account when charging for this type of material.

Overall permissions for 237 articles were received. Just over ten per cent of copyright holders refused to grant us permission, representing 45 or 14% of the journal articles requested. A further 20% did not respond either way, but they only represented 11% of the journal articles we required.

Table - Permissions by nationality of copyright owner

Nationality	Permission received	Permission denied	No decision
UK	34	5	2
US	18	4	11
Canada	3	0	0
Germany	0	0	3
Holland	2	0	1
South Africa	1	0	0
TOTAL	58	9	27

Table – Permissions by type of copyright owner

Type	Permission received	Permission denied	No decision
Commercial	27	9	14
Learned Society	25	0	1
University Press	6	0	2
Total	58	9	17

By receiving permission for 75% of the material we requested, we achieved a critical mass for the majority of modules. However, one module was denied ten of the sixteen articles it considered to be in high-demand. The articles in question were all from one publisher with whom the academic himself published research. These academic raised concerns that his students' learning would be adversely affected by this refusal and proceeded to take issue with the publisher himself, to no avail.

Seventeen of the 58 permission-granting copyright holders gave permission without being chased (30%). The other 41 needed to be pursued in order to gain permission, although four of these made the initial contact with ACORN before then needing to be 'chased' later on. The average number of times a copyright owner was contacted by ACORN before granting permission was 2.4 times. The maximum number of chases required was eight, although some copyright owners still have not responded and thus, arguably, require further pursuit. On average it has taken 66.5 days (approximately two months) to receive a signed Heads of Agreement document from participating copyright holders.

Only two of the 57 participating publishers (3%) produced their own agreement for ACORN to sign rather than signing our own Heads of Agreement documents. Nine publishers refused to participate with Project ACORN most of whom had a "no electronic permissions" policy.

There were many benefits to working with a subscription agent in pursuing electronic copyright permissions. For Project ACORN, these benefits included:

- Receiving publisher contact information from Swets' internal database.
- use of Swets' logo and signature on letters to publisher
- direct facilitation of five of the permissions
- Advice on negotiating with publishers both generally and in specific cases.

Publishers' Charges

We were very pleased that 92% of copyright owners who agreed to participate in Project ACORN made no charge. A very small number of publishers insisted that they would only participate if they could make a charge. These are illustrated in the table below.

Nationality	Type	Charge Type	Charge
UK	Commercial	Royalty	2.5p per page printed
UK	Commercial	License & Royalty	5p per page multiplied by 10 up-front. Then a further 5p per page printed in excess of ten pages.
US	Commercial	Royalty	\$1 per article printed
US	Learned Society	Royalty	20 cents per page printed
US	Learned Society	License	\$25 per page digitised

Table – Range of charges

It can be seen that currently there appears to be no consensus on the method or level of charge for this type of service. However, caution should be exercised in drawing conclusions from this small sample of charges. It should also be noted that discussions are currently underway between JISC and the Publishers Association on copyright clearance mechanisms which may facilitate more of a consensus.

The experiences of Project ACORN in gaining permissions from publishers show that there is currently a high degree of unpredictability within the process. Libraries cannot be sure whether permission will be granted, nor how soon those that are granted will come through. Refusals can have a dramatic effect on the attempt to provide a critical mass of material per module, while varying approaches to charging make it impossible to assess the costs of permissions in advance. Preliminary experiences from Project ACORN's second phase of gaining permissions for modules running from September 97 indicate only a small overlap (18) in the publishers to be approached for the second phase, increasing the uncertainty about responses to these permissions requests.

Digitisation issues

Having made an assessment of the implications of different format types we opted to scan and OCR the articles into Adobe PDF (Portable Document Format) because it retains the appearance of the original article, as well as the original page numbering. Many publishers have opted for this format for their own electronic articles, indicating that this is a format which they find acceptable. Digitisation, however, proved to be a very complex, time-consuming and multi-staged process.

The first hurdle in the process of digitisation was to obtain a 'clean' original to work from. As only 25% of the material identified was held by Swets & Zeitlinger in their back sets department we began by using photocopies from Loughborough's stock. Unfortunately, as these were high-demand articles, they were not in good condition, having been in heavy use for some years. Despite taking great care in photocopying,

they were not suitable for scanning, and inter-library loans had to be obtained from the British Library instead. Scanning from bound issues and volumes was sometimes possible; this, however, required the purchase of a book scanner to compensate for curvature in the text.

The equipment used by Swets & Zeitlinger for scanning from bound volumes is a Minolta Bookscanner PS-3000P, scanning at 400 dpi (dots per inch), with 64 levels of grey scale. The PC used is a Minolta Pentium 200 Mhz with 32Mb Ram and with a 1.6 gigabyte hard disk. For unbound copies, the equipment used is a Rank Xerox XDOD-system including the Document Capture Machine 620 (DocuDCM 620). This is a 200 to 600 dpi duplex scanner with 256 levels of grey scale. The PC used is a Compaq Pentium 90 Mhz with 32 Mb Ram and a 1 gigabyte hard disk.

The actual OCR-ing and reviewing is done on the Minolta system using Adobe Capture 1.01. After proof-reading, Adobe Acrobat Exchange 3.0 is used for minor corrections to the articles, cropping, and merging each different page file into one PDF file. ScanFix software is used on the scanned images to de-skew them and the de-skewed image files are then OCRed to produce PDF text files.

We opted for Portable Document Format text files, rather than image files, but the advantage of an image file is that it is precisely that - an image of the page in question. It therefore requires little checking and no proof reading. However, the disadvantages of image files are that they are far larger in terms of bytes, they take up more space, and are slower to move around the network. In particular, printing from image files can be very slow, and the rate at which they appear on-screen for viewing can also be off-putting. Text files are superior in terms of their speed of display and printing across the network, but ensuring the accuracy of the electronic copy is extremely time-consuming.

Our most recent estimates for the whole process of digitisation to text files are that it requires at least 30 minutes per page to produce electronic copies with an accuracy of 99.99%. This is comparable to the On-Demand Publishing in the Humanities project's findings where the whole process of digitization to text took between 30 minutes and one hour per page¹⁰. Commercial digitisation companies are able to improve on this time particularly if scanning long back-runs. However, this level of accuracy can still leave a couple of errors per page, depending on the number of characters on each page. Clearly, digitising to text is a costly process, and the length of time required for each article means that it is difficult to cope with digitising a large volume of material over a short time period.

Unlike the digitisation of long back-runs of journals, which may have the same or similar appearance in terms of layout and font, digitising articles from 131 different journals, which the project needed to do, requires the process to be tested and adjusted each time, making it unlikely that this type of digitisation will achieve the lower costs which higher volumes of like material can achieve. Unfortunately,

the timescales for digitising articles can be very short if the identification of material and the receipt of permissions are slow. This was precisely the project's experience in its first phase, and Swets & Zeitlinger were obliged to provide half of the files as image files in order to meet the tight deadline for the availability of the electronic service.

This same situation may well occur in the second phase of the project, and it is clear that a cost-benefit analysis is needed in order to assess whether text or image files are most appropriate given the circumstances. As will be seen later, some users were unhappy with the on-screen legibility of the image files, but there were no complaints about the time articles took to display or print. Legibility may be improved by using a later version of the Adobe Acrobat reader on campus, while improvements in scanning software may help with digitising to text (a new version of Adobe Capture has recently become available). However, the current position is that digitisation to text is an extremely costly element for an electronic service.

Developing the electronic system

The guiding principles for the approach adopted by the project were that the system should be portable to other sites or institutions, and that it should where possible integrate the use of readily available software. The electronic articles are held on a local SUN Unix-based server within a relational database management system, in this case Sybase. They are accessible from the TalisWeb OPAC and the library's Web pages, and are retrieved using Netscape. CGI (Common Gateway Interface) scripts link the documents to Netscape and the Acrobat reader and also enable the project to monitor usage of the electronic documents.

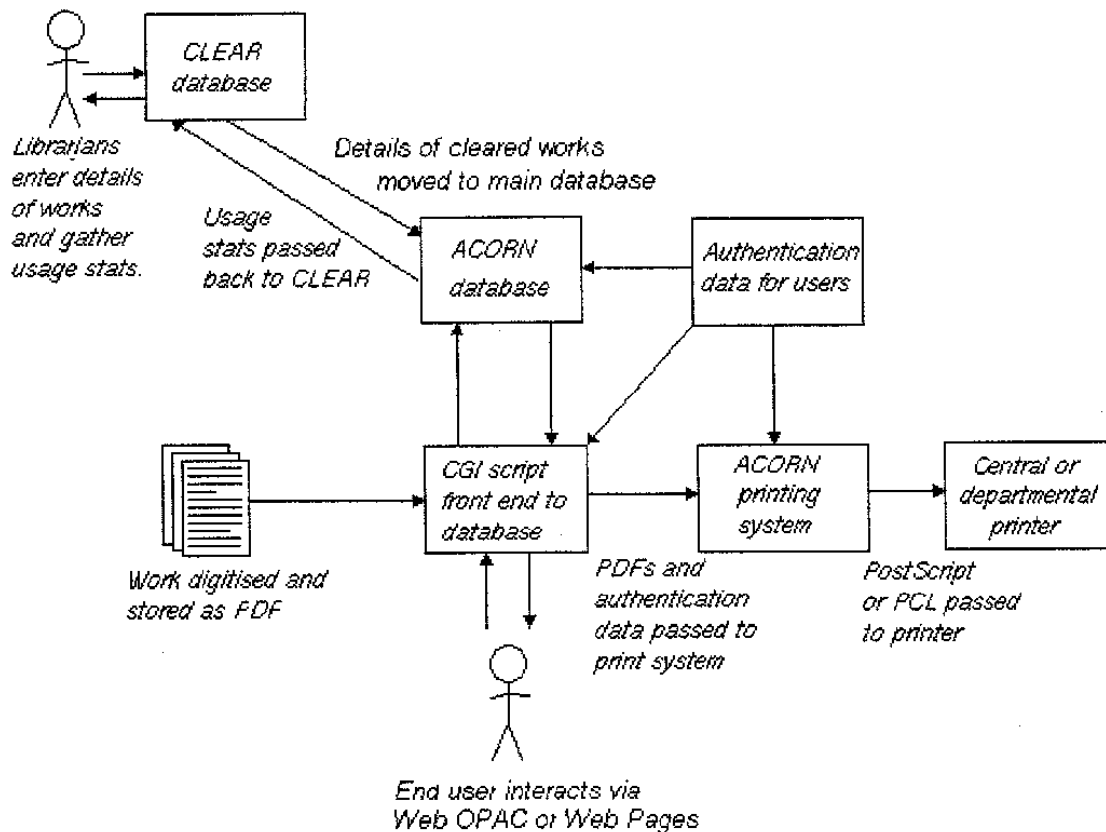
Electronic copyright management

The database developed for managing electronic copyright permissions is called CLEAR (Copyright-Licensed Electronic Access to Readings), and uses Microsoft Access on a PC running Microsoft Windows 3.11. It is a low cost electronic copyright management system, linked to the Sybase database holding the articles. All usage of articles is logged at the level of the individual article and user and the usage data is downloaded into CLEAR which holds information on types of agreements with publishers and rates of charges.

CLEAR also holds information about reading list articles, the modules they come from; the tutors who teach those modules, and the publishers who own the copyright. It can generate reports and graphs of management information about the electronic articles and their usage and is used to calculate payments and to provide publishers with their own tailored usage reports. Such a tool is essential where large numbers of articles and publishers are involved.

Acorn System Model11

The Acorn system model contains a number of separate modules that communicate with one another in order to provide the services required of the ACORN system.



This diagram shows the various components in the system model and how they inter-relate with one another.

When permission has been granted and an electronic copy of the article made, it is placed in the main ACORN database. In order for end users to gain access to it, they must pass through an authentication system to ensure that they are allowed to access the requested documents. If they are, the system allows them to view the documents and/or print them.

From the system perspective viewing a document is simply a matter of returning a PDF file to the user's machine and then recording the date, time, and user and document details in the main ACORN database. The model also includes a print system that the user must interact with in order to choose an appropriate printer. This print system then checks that the user is allowed to use the chosen printer, generates a print job for the requested document and then submits it to the print system on the user's behalf. The main ACORN database also maintains a record of what pages of a document a user has printed and when.

The end user has two entry points into the Acorn system, via the library's Web pages (accessible from the department's Web pages) and via the TalisWeb OPAC's reading list module. Whichever way the user comes into the ACORN system, they have to supply authentication information if they wish to view or print the work. The authentication information that the ACORN system requires is the user's central services username and password (i.e. the user- name and password used accessing other university services, such as email).

Once the script on the main ACORN server gets a username and password it encrypts the password and compares it with the encrypted password from the central services password file. If they match, the script generates a cryptographically secure session identifier. It is this identifier that is returned from all the subsequent forms and contains enough information for the receiving script to be able to authenticate the user, check that the session has not timed out and ensure that the session identifier has not been tampered with.

The need to provide time limited sessions is important in order to prevent users from using other people's account details to gain access to works that they are not themselves entitled to. Once authenticated, the user is presented with three basic operations that they can perform; they can view the document online, print it out on paper or exit the system. Viewing a document is easily achieved by returning a PDF version of the document.

It should be noted that one feature of PDF that the Loughborough implementation of the ACORN system model has made use of is the ability to restrict the use of the 'cut and paste' and print operations from within the Adobe Acrobat readers. These forces the user to use the print system provided by the ACORN system and therefore permits the printed form of the document to be stamped with the time it was printed and the user it was printed for, and also records printing details within the main ACORN database for later analysis.

A number of other security features have also been put in place - the articles are only accessible from machines on Loughborough University's campus, a copyright statement has been added to the footer of each page, both for on- screen and printed copies, and the user's ID appears on any print-outs, together with the date and time of printing.

Non-standard departmental printers have been mapped into the ACORN sys- tem in the case of two departments and the modular approach taken with the implementation at Loughborough allows new printers to be brought online without rewriting the rest of the system.

In order to test the portability of the ACORN system model, the ease with which the ACORN system can be implemented at Leicester University is to be investigated.

Leicester University provides a different library and computing environment, with the Libertas Library system, different approaches to printing and user authentication and some different hardware platforms. This will demonstrate both whether the ACORN system model can fit in with the needs of different libraries and also which parts of the implementation of the system can be "packaged" and which need may need to be tailored. It is already apparent that user authentication and printing arrangements will provide the key challenges regarding portability.

Training users for an electronic service

Having developed the electronic system it was important to consider how best to train users for the launch of the service. In the light of the results from the survey of academic staff, it was decided that training sessions and materials needed to cater particularly for those who had little experience of using information technology, and that any frustration this might cause for more experienced students would need to be accepted.

The training materials consisted of a guide to using the Adobe Acrobat document reader, in the form of a ready reference card, and an A4 flyer listing the modules which had full text articles available, and how to get to them. The materials were piloted with a number of library staff, including those familiar with IT and staff such as shelvers, who did not generally use IT in the course of their work. They were refined in the light of comments and then used in library staff training sessions. Half hour sessions were offered to library staff, consisting of a presentation, a demonstration, and the option for hands-on practice at the end. The library's seminar room had only 3 PCs for hands-on practice so some staff was not able to try this out, but in response to their requests for more hands-on practice we organised some drop-in sessions in the week before the service was launched.

With regard to student training, we tried to arrange sessions in conjunction with lecturers in the departments, so that both staff and students could experience the sessions together, and so that the support of the lecturers was visible to students. We held 11 training sessions in departments, and a further 2 open lunchtime sessions in the library's seminar room. In this way we reached at least 50% of the 600 students at whom the service was targeted. The printed materials were distributed in the training sessions and were also made available electronically on ACORN's Web pages.

Facilities in the lecture rooms in which the training sessions were held were very variable. In many cases the only equipment available was an overhead projector, so the service had to be shown on overheads. In some cases a PC was available, so a PowerPoint demonstration was possible, but there were no facilities for hands-on practice.

In order to evaluate the training sessions a simple evaluation form was designed for distribution to the students at the end of each session. The form asked just three questions:

What did you find most helpful about the training session?

How do you think the training session could have been improved? Any other comments?

Forty-nine forms were returned and future training sessions are to be adjusted in the light of the comments included. It became clear that students appreciated the 'step-by-step' approach to the sessions, coupled with their clarity and simplicity. Despite the fact that much of the student training had to be performed via OHP due to the lack of computer facilities in teaching rooms, some students said that this was the most helpful part of the training session: 'clear instructions and plentiful overheads'. However, the main improvement suggested by students was the need for hands-on training and this finding was confirmed by a later questionnaire about students' use of the system, where many experienced difficulties in accessing the service. The lack of access to well-equipped facilities for hands-on training does, however, continue to pose problems.

Preliminary findings on usage and users' reactions to the service

During the 8 week period of Semester Two when electronic articles were available to students they were viewed 390 times, viewed and printed 221 times, and printed without initial viewing 150 times. Usage of articles by department showed that Geography articles were accessed 397 times, Human Sciences articles 152 times and Information and Library Studies articles 212 times. The number of articles available for each department was 149 articles for Geography, 44 for Human Sciences and 44 for Information and Library Studies. The pattern of use over time was influenced by the examination and revision weeks in the latter part of the period of availability, when usage increased to its highest. Viewing of articles was high initially, while viewing and printing, and printing only, increased as the semester progressed and the examination period got underway.

The usage data suggests that students are not reading entire articles on screen - the average duration of a "view only" session was three minutes 52 seconds, although this data was based on only 99 viewing sessions which were exited correctly out of a total of 390 viewing sessions overall. 'Viewing and printing' sessions were slightly longer, at four minutes 56 seconds per session on average. Printing of specific pages or sections of the articles was not nearly as common as printing the entire article. And there was a trend later in the period of availability for articles to be printed out without initial viewing, indicating that the service was being used as an on-demand printing facility.

The paper short loan collection at Loughborough University allows for an article to be loaned to five individual users in the space of a week, if each user keeps the article for the maximum amount of time. With regard to 13 of the individual electronic articles, between five and ten users accessed the same article within the same one week period and used each article between seven and 17 times in that same week, an intensity of usage which the paper short loan collection could not meet without multiple copies of articles.

Eighty articles were unused, and likely reasons include late availability of articles, the timing of the service launch part way through a semester, and possibly lack of training or lack of encouragement from lecturers to use the service. Twenty-three per cent of registered users accessed the service, a high proportion considering it was a new service and launched late in the academic year. This augurs well for usage in the second phase of the project when the service will be launched at the beginning of the semester.

The library proved a popular access point for articles, despite having only 4 PCs from which electronic articles could be accessed. Usage from the library exceeded usage from central services machines (190 available) and this could perhaps be attributed to the help and support available to users from library staff or possibly that the library was perceived as the natural access point for this type of published information. Access from departments was also high where good facilities for access were available.

Many of the usage findings were confirmed in questionnaire returns from students. In addition, questionnaire returns indicated that while articles were used mainly for course work, the third highest use of the service was for wider reading. This finding is in contrast to the use of the paper short loan collection. Some users experienced difficulties with the on-screen legibility of some articles, and while two-thirds of students said they would not be prepared to pay for the service, one third indicated that they would. As the university's standard printing charges were passed on to users (5p per page) some students may have felt they were paying already, but these charges did not include any copyright charges. There were many encouraging comments on the further development of the service (97% of respondents being in favour).

Reasons given by students for non-use of the service included lack of awareness, the timing of the service, technical problems in gaining access, and, for a small minority, a dislike of IT. Interestingly there was little correlation between IT skills levels, training and training materials, and service take-up by students, as reported in questionnaire returns. However, there is evidence from other projects that IT skills may well be a crucial factor influencing service usage. On-Demand Publishing in the Humanities found that students attending training sessions needed a very basic introduction to computers before the service itself could be presented to them¹² Eurotext's student focus group's findings indicate that student's themselves report

lack of awareness of electronic resources and lack of knowledge about how to use them as reasons for non-use.

Focus group discussions again confirmed many of the above findings. The advantages of the electronic over the traditional short loan collection were perceived to be 24 hour access, the fact that items were always there and not subject to vandalism and that there were no fines and no time limits for loan. The disadvantages of the electronic service were its coverage, (only journal articles) and size, and its potential vulnerability to a power failure.

Concern was expressed by some library staff about an increased workload in chasing reading lists and acquiring permissions for an electronic service, while computing service staff felt that such a service could place more pressure on already over-stretched IT facilities in the library and around the campus. The wider implications of the service for teaching and learning were discussed, and links to other Web-based material was seen as potentially useful. However, there was concern that providing access to this type of information could not be considered as a replacement for teaching.

Conclusion

The experience of Project ACORN to date indicates that the development of electronic collections of high-demand readings provides a value-added service to students. Over time, students may tend to focus more on electronic readings once they are confident about using the service, and usage of paper-based material may drop. Educationally, of course, this may not be seen as beneficial, although there is some indication from Project ACORN that an electronic service may facilitate wider reading in some cases.

The reactions of users to the electronic service indicate a very positive attitude to further development, tempered with constructive comments on aspects of system design and service coverage. Service usage was high given the timing of its launch, and the system itself proved robust, with no major operating difficulties. The service is also able to overcome some of the shortcomings experienced by students using the traditional short loan collection.

However, a number of factors are currently inhibiting the wider development of electronic collections. These include the difficulty of identifying material for the service, the time and difficulty involved in copyright clearance procedures, the very high costs of digitisation, and the pressures of timescales of for the mounting of electronic material. Some of these issues are now being addressed at national level by JISC through a series of joint working parties with publisher representatives. These are addressing licensing, copyright clearance archiving and fair dealing in the electronic environment. Whilst the technology has presented us with problems which have tended to be soluble, economic, legal, psychological and social issues still need to be resolved.

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