Positioning Librarians as indispensible to the new Virtual Learning Environments (VLEs)

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Abstract

This paper discusses the explosion in the use of electronic resources by students and the development of e-books. The existing high usage will intensify as virtual learning environments (VLEs) become the primary means of interaction between students and universities. A brief outline of university library procurement in the UK is given, followed by an analysis of a recent ground-breaking tender for e-books for higher education libraries in the UK. The continuing development of a bespoke subject collection of e-books for nursing students is explored in some detail, as is the demand for non-traditional resources for the VLE. The paper closes by discussing the information architecture necessary to streamline and unify access to resources in the hybrid library, and to lay the foundation for an architecture appropriate to the electronic library.

Keywords: Virtual learning environments; e-books; information architecture.

1   Context

1.1   Student Use of Electronic Resources

The overwhelming popularity of e-resources has long been recognised. Morse and Clintworth [10], reporting on electronic journal use in an academic health science library, record an overwhelming preference for the electronic form: 28,000 viewings of full-text articles, compared with 1,800 uses of the corresponding print volumes. They conclude that "the overwhelming magnitude of the electronic usage must primarily represent the satisfaction of needs that were previously unmet in the print domain".

Tenopir's digest and analysis of earlier surveys and research studies [13, p. 45] document two intuitively quite obvious facts. First, convenience "remains the single most important factor for information use. Desktop access, speed of access and the ability to download, print and send articles are top advantages of electronic journals" for all groups of users surveyed. Second, younger users are more enthusiastic adopters and rely on electronic resources more heavily.

These trends are evident in statistics from my own library. Downloads of full-text articles from e-journals have increased from 220k in 2002/3, through 485k in 2003/4 (when they surpassed for the first time loans of monographs), to 610k in 2004/5. At the same time loans of monographs have started to decrease, and reshelving surveys are showing very low usage of hard-copy journals. One interesting factor is that Bournemouth has traditionally been a teaching rather than a research university. This high and increasing use of the electronic journal literature is overwhelmingly by undergraduate and taught postgraduate students, rather than by researchers.

A further interesting point is that usage is extremely high in our Institute of Health and Community Studies. Here the majority of students are working nurses, studying part time, who tend to be older and more technology-averse than their counterparts entering university straight from school. Convenience is obviously a major contributory factor here: the availability of e-resources 24x7, on campus, in hospital libraries, or at home. Recent statistics show that 72% of these students access electronic resources from home.

We are therefore seeing an explosion in the use by undergraduates of journal articles, traditionally more the preserve of the researcher, because of the factors documented by Tenopir: convenience of availability and the preference of a younger generation for the electronic form. Use by undergraduates is not intensive, as it is by researchers; however it is widespread and increasing.

1.2   E-books

Although revolutionary in terms of delivery and take-up, the advent of e-journals has not changed the mode of their use. Indexes and abstracts are searched; articles are selected; prints of them are procured. This is fundamentally no different from the hard-copy process of getting photocopies of articles, either from one's own library or on inter-library loan, after a literature search. The process has been telescoped by the technology, and the user is more in control; but the end-product is the same and this is essentially the way that scholars have worked for many years.

However, e-books are different, partly because of the extent of their individual content. Library users are either tied to a screen to read large volumes of text, or obliged to print it themselves. This is not the way that users, or librarians, have worked with hard-copy books, and the end-product is quite different. The difference is magnified because the numbers making intensive use of e-books, particularly textbooks, comprising the whole undergraduate population, are much larger than the numbers making intensive use of e-journals. Cultural and technical difficulties (network and

hardware availability, printing capacities and costs) are potentially much more critical.

E-books have taken a number of forms. Initially they were intended to be read on dedicated hardware devices. However take-up was very slow, because of cost, lack of available hardware, poor on-screen readability and lack of a robust catalogue of available titles [7]. The norm now, particularly in higher education, is for a software solution (such as Adobe) run on a PC, laptop or PDA. Given their portability and multiple functionality, the last two devices seem destined to push out the dedicated reader.

Approaches to e-books in terms of functionality are dominated by the metaphor of the book and the database. Gibbons, Peters and Bryan [6] define seven types of functionality, including: physical functionality of the device (such as readability, ergonomics), functionality that helps read the content (such as searchability, navigational tools), enhancing functionality (such as inclusion of multimedia, links to data and bulletin boards), functionality that places the content in a context (such as links to other e-content, inter-textual searchability), functionality that helps the reader "possess" the text (such as making annotations, printing), and functionality that supports library activities (such as preserving the confidentiality of users, being "scrubbable").

E-books over recent years have become available in greater numbers, through multiple channels, from both publishers and aggregators. However, the industry is still in the very early stages of development. Herther [7] identifies the following problems and obstacles:

- Lack of a clear open standard for operating systems;

- Fears about the protection of content and the rights of the content owner in the context of giving users flexibility;

- Lack of appropriate content in suitable quantities;

- Pricing of titles, software and hardware;

- Lack of integration into the general market for books.

1.3 The Virtual Learning Environment

The virtual learning environment (VLE) is not a particularly new phenomenon. It has however now gained widespread acceptance, and will prove itself to be a transformational technology, changing fundamentally how students and their universities interact.

One can define a VLE as "the components in which learners and tutors participate in 'online' interactions of various kinds, including online learning". The principal functions of the VLE are:

- Controlled access to curriculum that has been mapped to elements (or "chunks") that can be separately assessed and recorded.

- Tracking student activity and achievement against these elements using simple processes for course administration and student tracking that make it possible for tutors to define and set up a course with accompanying materials and activities to direct, guide and monitor learner progress.

- Support of on-line learning, including access to learning resources, assessment and guidance. The learning resources may be self-developed, or professionally authored and purchased materials that can be imported and made available for use by learners.

- Communication between the learner, the tutor and other learning support specialists to provide direct support and feedback for learners, as well as peer-group communications that build a sense of group identity and community of interest.

- Links to other administrative systems, both in-house and externally. [5]

A different view is offered by Secker [12], who identifies five major tools that are integrated within the VLE:

- Content delivery tools – teaching materials in a wide variety of formats (audio, video, PowerPoint, as well as text) are made available to students in one convenient place, generally accessible only to the students of the institution.

- Communication tools – allowing many-to-many interaction through means such as bulletin boards and discussion groups.

- Assessment tools – enabling formative or summative assessment, self-testing, diagnostic testing or formal assessment; complete with automated marking as appropriate.

- Course management tools – enabling tutors to record data about students' progress, to track individuals or groups of students; students are also able to submit assignments and upload presentations.

- Course resources – learning resources not produced in-house can be uploaded or linked to.

VLEs are also being integrated into the wider university systems environment, including student records or registry systems, finance systems and learning resources. This wider context is called the Managed Learning Environment (MLE).

2.   Challenges for the Library Profession

The explosion in the use of electronic resources is well known and well documented. As VLEs become the normal medium for interaction between students and university throughout their learning, the electronic medium will become the norm for all learning materials, just as it already is for students' social and leisure pursuits.

Work started in 2002 by Markland and Kemp [8] showed that initially there was little integration of library-procured learning resources into VLEs. The two systems (library web-site access to e-journals and the institutional VLE) were seen by academics creating resources for VLEs to be separate and discrete. However, the student perception of the ideal provision is "to have resources to support their learning delivered to them online with the speed of a search engine, and the 'quality stamp' of their university library or their tutor's recommendation".

We therefore face a two-fold challenge. First, we must develop our procurement practice to achieve as much control as possible of the market in electronic information resources, particularly the developing market in e-books. Second, we must develop an information architecture that will provide a bridge from the current hybrid print and electronic environment to the fully electronic one.

3.   Procurement

3.1   Library Procurement Consortia in the UK

Perhaps the most useful tool for carrying out procurements is the library consortium. Such aggregation of purchasing power brings many advantages. New services, for instance the truly shelf-ready – catalogued, classified and processed – book, have been negotiated through the strength of consortia. Quality of service is monitored closely and enhanced through continuing management of contracts based on tight specifications of service; pooled knowledge of suppliers' performance against these specifications lends force to this process. There are considerable savings in terms of the time needed by individual libraries to manage complex procurement procedures and the resulting contracts. Quite startling discounts on books have been obtained by UK consortia, for both public and academic libraries.

Consortia can be powerful entities, particularly when they take a holistic view uniting both print and electronic procurement: publishers produce and deal in both media; libraries integrate print and electronic forms in their service to users; they should integrate the procurement of them too. Consortia are the only library organisations that have a chance of affecting the marketplace; individual libraries certainly do not.

In the UK procurement has generally been undertaken by two different types or organisation (see Ball [3] pp. 53-61 for a full discussion).

First there are the seven regional purchasing consortia, which cover virtually all universities in the UK. Generally these are funded by a combination of subscription and the staff resources of their members. Some have developed from specifically library consortia. Others are general university consortia, undertaking a very wide range if procurement (e.g. laboratory supplies, stationery, PCs, catering as well as library resources) and staffed by purchasing professionals. The largest of these consortia is the Southern Universities Purchasing Consortium (SUPC), with 47 member institutions ranging from the very small to the very large. SUPC contracts with suppliers are worth over £100m ($187m) p.a.; the library contracts alone are worth £31m ($58m) p.a. The regional consortia have in the past concentrated on the procurement of hard-copy resources.

Second there are two non-commercial organisations acting as agents for higher education in the UK. The first is the Higher Education Funding Councils' Joint Information Systems Committee (JISC), which is funded by a top-slice. JISC has notable agreements, under NESLi2 and JISC Collections, for a wide range of e-journals and other content. The other is Eduserv/CHEST, which although non-commercial and owned by the higher education sector, is funded by a percentage of the revenue it generates. CHEST offers agreements for software and collections of e-journals and databases.

3.2   The Tender for E-Books

The combination, of demonstrable hunger on the part of undergraduates for electronic texts, the increasing availability of e-books and the incipient need to integrate electronic resources into the VLE, led the member libraries of the SUPC in 2004 to investigate the possibility of a tender for the large-scale procurement of academic e-books, particularly textbooks. It was recognised that this tender was potentially more difficult than hard-copy tenders, since the market was under-developed and the business models very fluid. As with all SUPC tenders, the standard five stages of the procurement cycle were followed: identifying the need, preparing the specification, finding the supplier, awarding the contract, measuring and monitoring performance. Following and understanding this cycle is fundamental to taking control of relationships with suppliers and of the market place (see Ball [3] pp. 45-53 for a full discussion). This structure is particularly important when procuring e-resources, where the business models are still fluid.

The main aims of the tender were to provide members with agreements that: were innovative in terms of business models giving value for money; were flexible, offering those with differing requirements appropriate options; exploited the electronic medium in terms of granularity and multi-user access; focused on users' needs rather than libraries' requirements; and encouraged the addition of library-defined content. The agreement resulting from this tender was also to be made available to all higher education institutions in

the UK and to members of the UK higher education regional purchasing consortia.

Two distinct requirements were identified in the tender:

> **Requirement A:** a hosted e-book service from which institutions can purchase or subscribe to individual titles;

> **Requirement B: a** hosted e-book service of content that is specified by the institutions. It is anticipated that this service could be subject based and subdivided by subject area.

It was envisaged that the first subject to be tackled under Requirement B would be nursing, building on the work of the Nursing Core Content Initiative (NCCI), based on the Libraries for Nursing/ Royal College of Nursing (RCN) core collection for nurses.

From eight initial tenders, four suppliers were selected for detailed consideration, the selection being based on criteria such as the academic nature of the content, satisfactory authentication arrangements, demonstrable benefits for the consortium, and customer service. Three were general aggregators; the fourth offered a subject approach.

3.2.1 Business Models

The three general aggregators offered pricing models based on the e-book list price. The e-book prices for 1190 titles common to the three bidders covering four publishers were compared, and it was clear that for many titles there was no common e-book price. This comparative exercise demonstrated that the average e-book price for these four publishers ranged from $99.9 to $102.2, a spread of 2.3%.

The most depressing aspect of the tender was that two of the three general aggregators tended to mimic hard-copy business models very closely, allowing only single concurrent user access, or a fixed number of accesses each year. The electronic medium is ignored and many of its benefits lost under such restrictive models, which do not match the requirements of the modern university student for flexibility and immediacy of access. There is no reason why such models should be carried over from the printed to the electronic medium, and this lack of innovation influenced the outcome of the tender.

On the other hand price comparisons with hard copy are by no means necessarily favourable. One e-book aggregator, for instance, charges the list price plus a fixed premium for outright ownership. In the UK VAT at 17.5% is levied on e-books, but not on printed books. Taking into account the average discounts available to SUPC members on both hard-copy and e-books, and assuming no difference between hard-copy and electronic list prices, the price of outright ownership of the e-book was a startling 82% more expensive than the hard-copy price. Moreover, the model allowed only one user at a time. Put another way, the bookfund would buy 45% less books in electronic form than in hard copy.

In justification, one might argue that e-books bring savings in whole-life costs – processing, handling and storage in particular. However, many libraries, such as mine, are now self-service environments for the issue and discharge of books: 70% of Bournemouth's transactions are now through this medium. Thanks to an earlier SUPC contract over 90% of hard-copy books are delivered completely shelf-ready. Shelving is carried out by student labour, paid for by fines income, which of course does not accrue on e-books. The University does not charge the Library for space used. This economic argument does not justify buying 45% less books.

Comparing the prices of the different aggregators proved a complex matter, given the different elements, such as platform fees and costs per full-time equivalent student, to be included. The comparison was however well worth while, since it demonstrated some very wide variations. With the outright purchase models, the cheapest, calculated on 1500 titles, was 63% of the price of the dearest. With the subscription models, the cheapest on offer was only 20% of the most expensive.

As Algenio and Thompson-Young [1] point out, one might also argue that outright purchase of e-book titles is preferable to subscription. This payment method is subject to inflation and obviously less controllable; it may also lead to the dangers inherent in the big deals for e-journals. However, the price differential of the model just discussed outweighs this argument too. The differentials are quite startling, but it must be borne in mind that, given variations in coverage of the different aggregators, one is not comparing the price of exactly the same content. Rather one is comparing the purchasing models, based on the average list prices referred to above. In my view it is the models that are important: over time, as more publishers provide their titles in e-book form and as the size of the available general collections grows, the aggregators will be offering very similar content.

This tender was an opportunity to send an unmistakeable message to the e-book marketplace, that vendors have to provide flexible and cost-effective business models reflecting the needs of users and exploiting the potential of the medium.

3.2.2 Bespoke Subject Collections

Despite offering business models derived from the hard-copy world, e-book aggregators do not fulfil one basic requirement of any hard-copy aggregator: namely that they will supply any book from any publisher. To overcome the restricted nature of the content on offer, Requirement B of the tender addressed bespoke collections. Before the SUPC tender, work had been under way by a group of universities (Anglia Ruskin, Bournemouth, Glasgow Caledonian and West of England) and the Royal College of Nursing (RCN), to define a core collection of nursing texts for use in higher education, based on the Libraries for Nursing/RCN core collection for nurses (the NCCI). The object was to negotiate with aggregators to make this collection available

in electronic form, in order to overcome some of the problems experienced by nurses in higher education, who work and study in different locations under great time pressure.

This nursing collection was seen as the first in a series of bespoke subject collections to be defined by higher education. There would obviously be potential benefits both to students, who would have access to prescribed reading material in electronic form, and to the aggregators, who would be assured of take-up by the higher education community. One problem that arose was the well known issue of core textbooks that sell in relatively high volumes (see for instance Armstrong, Edwards and Lonsdale [2]). Publishers may be unwilling to make these available to libraries at economic prices because they will lose substantial revenue form sales to individual students.

Two of the three aggregators bidding for the contract expressed an interest in Requirement B, and demonstrated their willingness to negotiate with publishers on the behalf of libraries. The need for this initiative was demonstrated by comparing the list of 200 core titles against the offerings of these two aggregators: only 13% of these heavily used titles were currently available.

3.2.3 Results

Following a long and painstaking tender process Ebrary and ProQuest were chosen under Requirement A, and Ebrary under Requirement B. These two suppliers were felt to offer most to SUPC members in terms of innovative business models giving value for money; flexibility, offering those with differing requirements appropriate options; and exploiting the electronic medium in terms of granularity and multi-user access.

Since the award of the tender, work has continued on the NCCI. Core lists of 200 and 600 titles have been identified, with the large majority of titles coming from 12 publishers. Ebrary has reached agreement, or is close to agreement, with 11 of these 12 publishers on the principle of providing content.

However, the high sales-volume textbooks remain a problem, with publishers for obvious reasons unwilling to release them under the present business model. There are two potential solutions.

First, Ebrary has suggested a very different business model for libraries, focusing on the 40 UK universities providing nursing education. This model is under development with NCCI, and will probably be closer to the hard-copy model with which publishers are more comfortable. The second possibility, although one that is proving difficult to sell to publishers, is for students themselves to purchase the textbooks in electronic form. Access would last for the duration of the student's course, and the price would be lower than the hard-copy price. The advantage for the publisher is that they cut out the large market in second-hand hard-copy textbooks, profiting every time a book is sold to a student. The advantage for the student is a discounted price, combined with high functionality. The advantage for the library is that there is no longer a need to buy and circulate large numbers of textbooks.

3.3 Non-Traditional resources for the VLE

Over the past 10 years we have come an enormously long way in making electronic resources available to our users. Access to large collections of e-journals is commonplace in higher education. The availability of e-books is picking up, and, thanks to work such as the tender just discussed, libraries are beginning to influence the type of content published in e-book form. The open access and institutional repository movements are growing in compass and effect. The wide adoption and efficient exploitation of VLEs will however require a range of non-traditional resources not developed in-house, and will in some areas foster the development of new markets.

Lecturers and course teams will obviously produce their own content for delivery through the VLE. This will of course not be limited to textual material, but will include the widest range of formats – video, audio, databases, simulations etc. – and increasing levels of interactivity.

Libraries have for many years supported academic staff in procuring and producing content for course packs, originally in hard-copy but increasingly in electronic form (see McClelland and Hawkins [9] for a series of case studies based on Liverpool John Moores University). Services such as HERON and the British Library's copyright-cleared service in the UK have sprung up to support such developments.

Free open access course materials are starting to appear on the web. The best known example is MIT's Open CourseWare, which provides "open access to the syllabi, lecture notes, course calendars, problem sets and solutions, exams, reading lists, even a selection of video lectures, from 1250 MIT courses representing 34 academic disciplines" (http://ocw.mit.edu/OcwWeb/Global/AboutOCW/our-story.htm). By 2007 the number of courses is expected to expand to 1800; the materials contained on the MIT OCW Web site may be "used, copied, distributed, translated, and modified, but only for non-commercial educational purposes that are made freely available to others". MIT estimates that there are now 51 other sites round the world offering similar, though probably not as extensive, access.

Publishers are also starting to design and publish content specifically for VLEs. Blackboard offer a range of so-called "course cartridges", which enable academics to import publishers' content directly into a Blackboard course. Often tied in to a textbook, cartridges may contain a wide range of resources, including banks of test questions, PowerPoint presentations, and multimedia objects. One type, the Open Access Cartridge, has few restrictions on usage: once downloaded it can be used in the same way as content created by the lecturer. However, Blackboard's Standard Cartridge implements copyright protection and controls

access: only one cartridge may be used per course; content cannot be exported; students require an access key.

While some publishers, such as Pearson, have agreements with Blackboard to supply cartridges linked to textbooks, one can foresee a market in course content arising that is not mediated by the software supplier. Many universities do not use Blackboard or any other proprietary system, preferring open source software. Publishers, as the demand develops, will not wish to cut themselves off from a large segment of it.

This market will pose additional challenges for those procuring learning materials. As we are all aware, electronic publications are already more complex than hard copy in terms of rights management: one no longer simply puts a book on the shelf and polices copyright; licences may impose restrictions on the period of availability, permitted users or location, permitted use (non-commercial only), etc. The new learning materials for use in VLEs will bring their own complications in terms of what may and may not be done, attribution, re-use, export, number of students, and so on. Licences, pricing and the negotiation of them with a wide range of diverse suppliers will present even greater challenges. Repurposing or augmenting such materials will give rise to questions of precisely who (publisher, lecturer or institution) owns the rights to what content.

The bigger question raised by Noam [11], of whether the "ultimate providers pf electronic curriculum … will not be universities but instead commercial firms" and universities become providers solely of the educational environment, is outside the scope of this paper.

4. Information Architecture

The second challenge to address is the information architecture that we present to our users. My guess is that we are currently in a state of rough equilibrium between hard-copy and electronic usage. The use of e-journals is intensive among researchers and academics, and widespread but not so intensive amongst undergraduates. Reliance on websites mediated by Google is also widespread, particularly amongst undergraduates, but probably also more than we would ideally like amongst the more information literate postgraduates and academics. However, use of hard-copy monographs is still integral to much teaching – obviously with the traditional variations across the range of academic disciplines. Whether it is so integral to students' learning is a question we would do well to ponder.

In the next few years that equilibrium will tip in favour of electronic usage. We have identified many of the straws in the wind: VLEs, increasing availability of e-books (in traditional form) and learning materials, institutional repositories, etc. One major challenge that we now face is to evolve an information architecture for the preponderantly electronic environment from the fragmented legacy systems with which many of us still work.

Figure 1 shows Bournemouth's current information architecture, charting the user's path from discovery to use of resources, and demonstrating a high degree of fragmentation. It also shows whether usage is increasing (↑) or decreasing (↓).

The main component is the library management system (LMS). This is essentially a hard-copy tool, marrying together a large database of books with a large database of borrowers under a defined set of permissions. It also provides access to over 20m catalogue records (overwhelmingly hard-copy) and facilitates EDI ordering of hard-copy books from our suppliers.

E-books can be approached through the LMS, but only at the title level. The e-book suppliers' platforms offer much greater functionality, allowing searching at the level of individual words in the text, and retrieval and book-marking at the level of individual pages.

E-journals can also be approached at the title level through the LMS. However, given the volume of titles that we have access to (currently over 12,000) and the potential changes in any year, the comprehensive and most up-to-date approach is through EBSCO A-Z, a listing of our titles provided and maintained by our serials agent. At the article level they are approached through the abstracting and indexing services; in many cases a link-resolver routes users directly to the journal article.

External websites containing a wide range of information (statistics, grey literature of various bodies and agencies, institutional repositories, directories etc.) are approached through listings on the Library website, and of course through external search engines.

Increasingly the VLE will provide a route to in-house teaching materials and also external resources.

The value to us of the LMS is decreasing, as the volume of hard-copy transactions and acquisitions declines. Bournemouth University currently spends about £450k ($843k) on hard-copy and £660k ($1.237m) on electronic resources; the changing usage figures were outlined above. However the LMS remains very expensive, at over 60% of the annual subscription to our VLE, which supports and provides efficiencies for the whole core business of the University. The costs of the other parts of the current information architecture are minimal.

We have made great advances in opening up electronic resources to students and staff, and in automating and outsourcing processes for hard-copy stock. The challenges now are to streamline and unify access to resources during the hybrid (print and electronic) library phase, and to lay the foundation for an architecture appropriate to the electronic library. Figure 2 shows the main elements of the proposed information architecture.

The most important element in terms of streamlining the identification and retrieval of resources for all our users is the **federated search engine**. This technology is now

mature and starting to be applied in academic libraries. It would provide a single search interface to a wide range of our resources, including our abstracting and indexing services, the LMS, e-book platforms and the VLE. It would offer one point of access and also deliver organised, contextually relevant results. This would be supported by, or include, a link resolver routing users directly to the electronic resources.

The increasing provision of e-resources highlights the need for a single sign-on **authentication** process that enables access to all available e-resources, including local applications such as the VLE and institutional repository. In the UK JISC is due to introduce Shibboleth in autumn 2006 and to phase out Athens by 2008. Shibboleth will provide institutions with a route to single sign-on to resources for users through the implementation of federated, devolved authentication.

We shall continue to need an **LMS** to deal with our legacy hard-copy stock and our declining hard-copy acquisitions. The challenge will be either to negotiate significant price reductions or to consider migrating to a cheaper LMS. The latter may be problematic because of the size of the legacy stock and the number of borrowers, and because of the functionality still needed for the automated and outsourced acquisition and processing of hard-copy. However it is neither justifiable nor sustainable to continue with the present level of LMS costs, given the costs of other, more sophisticated, mission-critical software, such as the VLE, and the declining importance of the LMS.

We currently have well over 100 licences for our electronic resources. Some are standard JISC/CHEST licences, but many are variations or are peculiar to the publishers. This complexity will increase as more licences are added. Full use of the VLE will intensify this complexity, since licences will have to cover rights to repurpose materials. A **rights management system** would record, collate and digest licences (for both staff and users), as well as support the renewal process.

5. Conclusion

We have examined some of the technological advances taking place: the advent of VLEs and the availability of electronic resources. They have accompanied and will fuel an explosion in the use of electronic resources, in an environment where students expect "the same robust connectivity and service orientation that they have experienced in the commodity world" (Duderstadt, Wulf and Zemsky, [4]).

There are obvious challenges here for librarians, in negotiating and exploiting the new geographies of electronic learning and resources, and we have examined two means of meeting these challenges.

First, our innovative e-books tender offered the opportunity of sending a strong message to the emerging e-book market place. Lessons have been learnt from the often painful experience of the e-journal pioneers. Higher education needs flexibility, both in terms of business models and access to resources. We are not willing to be forced into the strait-jacket of the hard-copy medium when the electronic form offers so much more. Nor are we prepared to accept the restrictive and expensive business models that some aggregators seem to be forcing on us. In terms of content, we are also seeking to take the lead initially in the area of procuring bespoke titles for our nursing students.
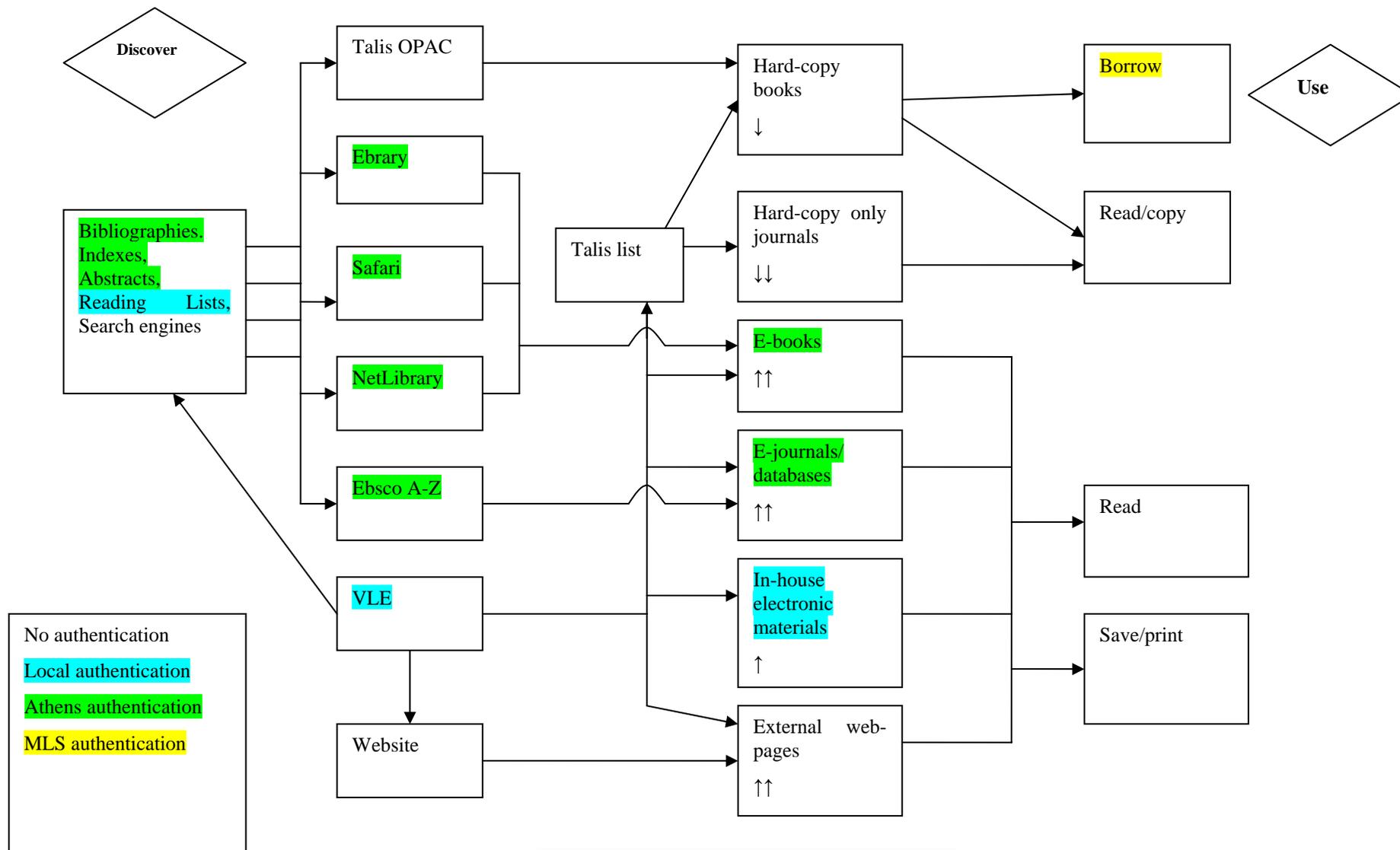
Second, we have identified an emergent information architecture, which will act as a bridge from the present hybrid library to the electronic library of the future.

Of course, only time will tell how successful we have been in shaping the marketplace and designing an appropriate architecture.
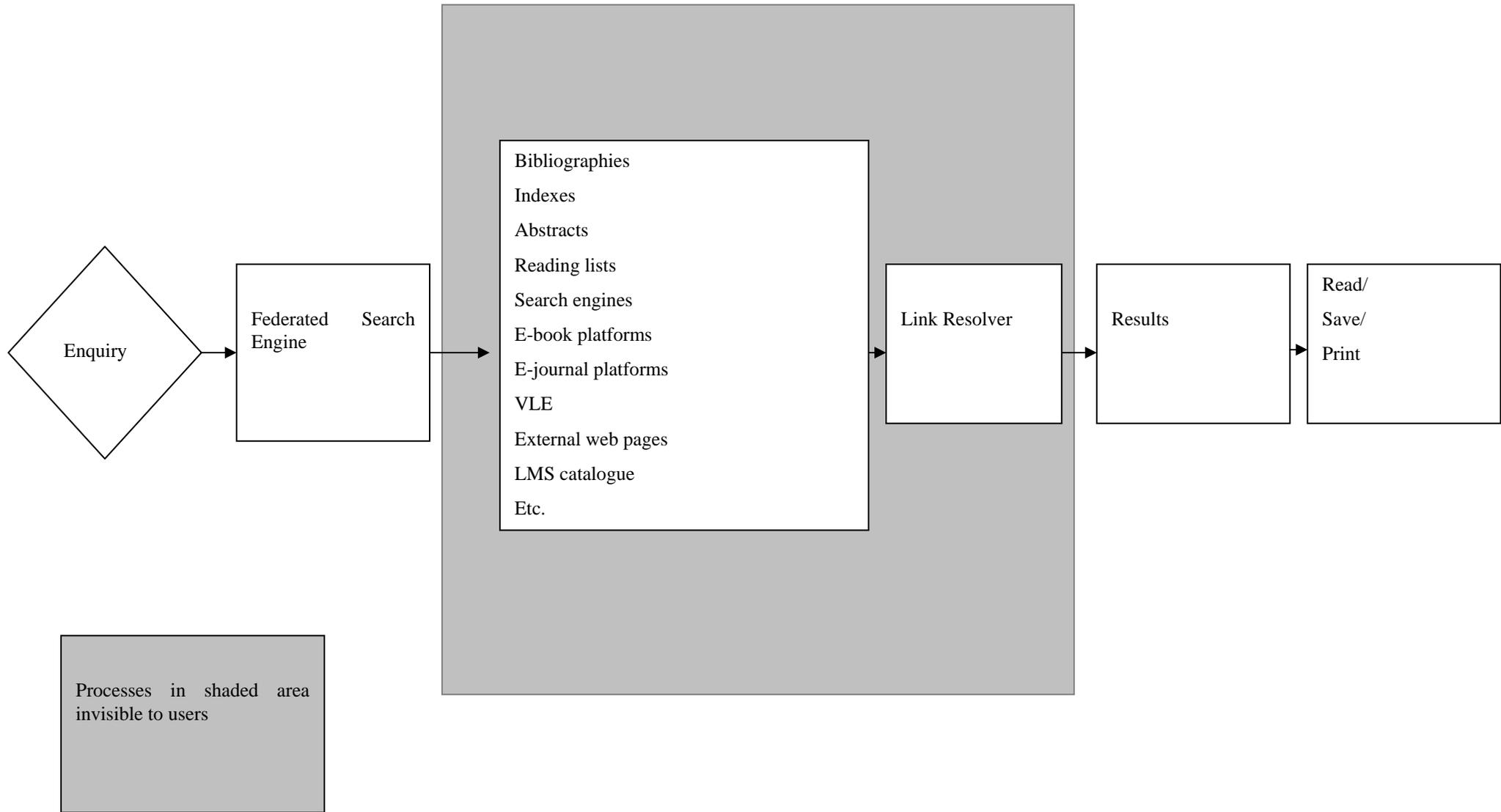
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Figure 1. Current Information Architecture

Enquiry

Federated Search Engine

Bibliographies

Indexes

Abstracts

Reading lists

Search engines

E-book platforms

E-journal platforms

VLE

External web pages

LMS catalogue

Etc.

Link Resolver

Results

Read/ Save/ Print

Processes in shaded area invisible to users

Figure 2. Proposed Information Architecture