DELIVERing library resources to the virtual learning environment

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Abstract: Examines a project to integrate digital libraries and virtual learning environments (VLE). Conducted a user needs analysis and evaluated three reading or resource list management systems including TalisList, Sentient Discover and an open source solution, Bookworm. Reports on the technical specification for the system, but also subsequent work to develop a rights management system and a 'library area' within the VLE where electronic resources can be placed. Discusses subsequent developments towards the integration of digital libraries and virtual learning environments, including the IMS specification for Resource List Interoperability (RLI). Concludes that collaboration between learning technologists and librarians is essential.

Keywords: digital libraries, e-learning, reading list management systems, resource list interoperability, electronic course packs.

1. Introduction

Those who work in education can be in little doubt that technology is increasingly shaping the development of teaching and learning. It is also clear that e-learning is impacting on the working practices of librarians (Secker, 2004). In October 2002 the Joint Information Systems Committee (JISC), a body which provides strategic guidance and advice to support the use of ICT in teaching, learning, research and administration in further and higher education (HE) in the UK, funded a series of

projects to investigate a variety of issues concerning the integration of virtual learning environments (VLEs) and electronic libraries. These projects were known as the DiVLE Programme (JISC, 2003). DELIVER (Digital Electronic Library Integration within Virtual EnviRonments) was one such project, jointly undertaken by the London School of Economics (LSE) and De Montfort University. DELIVER was supported by the VLE software company WebCT (http://www.webct.com), and the two institutional library management systems: Sirsi (http://www.sirsi.com) and Talis (http://www.talis.com). The project was completed in July 2003. This article describes the user needs analysis which was conducted at the outset of the project, the translation of this work into a system specification, and subsequent development that took place. The article concentrates largely on findings from the LSE, where the author is based.

2. **Background to related projects**

It is important to view this work in context as it builds on a body of digital library developments which have increasingly investigated providing personalised access to electronic resources. DELIVER was a project that built on the work of the JISC funded ANGEL (Authenticated Networked Guided Environment for Learning) Project, which was also hosted at LSE and ran from 1999 – 2002. (ANGEL, 2003; MacColl, 2001). ANGEL primarily created middleware to help integrate 'open' library resources into 'closed' online learning environments. It looked to provide solutions to problems that are currently obstructing the free use of resources by course instructors and learning technologists.

The ANGEL Project, in turn, built on earlier work, Headline, conducted by LSE, the London Business School and the University of Hertfordshire. The Headline Project (Hybrid Electronic Access and Delivery in the Library Networked Environment) was a Phase 3 project of the UK's Electronic Libraries (eLib) Programme and formed part of the Hybrid Libraries strand. (Headline, 2001) This three-year project began in January 1998 and aimed to design and implement a working model of the hybrid library. Headline's model was based around the user, with a user-dependent environment as a fundamental part of the project design. The system had access, via the login process, to the user's administrative details such as status, subject area and registered courses, and was able to use this information to

provide a tailored and supportive environment, which was known as a Personalised Information Environment (PIE).

Also of relevance to this paper are the 'MyLibrary' initiatives, which have mainly taken place in the US and Canada but with some implementations elsewhere (for instance in Slovenia, (Hristovski et al., 2003). Imitating initiatives on commercial Web sites, such as Amazon, Yahoo and even the BBC, library Web sites are increasingly trying to present users with personalised access to their content. A recent article summarised these developments and described how the University of Rochester implemented such an initiative to better meet the needs of its students (Gibbons, 2003). In the case of DELIVER, customisation was at the course level, rather than individual student level, but these developments are significant. They demonstrate how users increasingly want resources to be 'pushed' to them, rather than having to identify relevant resources themselves. Rather than viewing this as laziness on the part of the user, this development is increasingly necessary to combat information overload caused by the wealth of available electronic resources. Navigating the information environment has become increasingly difficult and tools such as reading and resource lists can be regarded as essential signposts to guide the user. Reporting from the JISC Usage Surveys: Trends in Electronic Information Services (JUSTEIS) project, Thomas (2004) tells how library websites and tools developed by librarians are under-used by students across further and higher education. Similarly, drawing on findings from JUSTEIS, Bonthron reported on e-journal usage by undergraduate students. Student usage of electronic resources is primarily directed by their lecturer and links from their course website or the VLE, rather than using library electronic journals pages. Bonthron argues:

The library manager may have to decide where to allocate effort — into library web pages which may be used intermittently if at all, or into support of academic staff and learning support staff in development of VLEs. (Bonthron, 2003)

3. Lists for learning

One of the most important resources for any course of study in UK HE is the reading list. It plays an important role from course inception, when it forms a vital piece of evidence for course approval, to directing learning as students follow the

course of study. The reading list is used in many different ways by different academic staff. At a minimum level it is used to give students an overview of a course, but this list is often enriched with commentary, notes and explanations that give the list a pedagogical value, and make it an important learning resource in its own right. Understandably, these lists are often regarded with an amount of pride and ownership by academic staff who invest significant amounts of time and effort in their creation.

The reading list has also become an important tool within institutions. Libraries are dependent on the information contained within a list to make ensure the appropriate resources are available either in electronic or in hardcopy format, for the students registered to study a particular course. There is often a tension between the role of the list as a tool and as a resource; the library requires the information within a list early in the year to ensure stock is in place, but the academic may wish to continually work on the resource up to the last minute to ensure currency and accuracy. This tension may lead to inaccuracies in the information given out to students, lack of resources to support a course, and general confusion over how the list is passed on to students.

The picture being drawn here is one that reflects a very traditional, paper-based, environment where a student 'reads' for a degree. It is clear that education has moved beyond this tradition in many ways, and specifically with regard to the provision of electronic resources, and a greater focus on interactive rather than passive learning. Despite these changes, the reading list as a concept still remains at the heart of many of the processes undertaken across an academic institution. As both a resource and a tool the reading list is evidently still vital, but it seems clear that the concept needs to be updated in terms of format, ownership and process to offer the best information available to students in the best possible manner.

Learning within HE institutions has altered significantly in the last 5 years since the development of Virtual Learning Environments (VLE). As a tool, the VLE is being implemented and utilised in very different ways across institutions within the UK. Many institutions are attempting to offer students what is termed 'blended learning' where face-to-face tuition is complemented by online support. Electronic resources have an important role within this environment, but many questions remain about how

these are presented and managed. The reading list concept obviously has a role to play in addressing this problem, and it is this issue that was tackled by the DELIVER project.

4. Multiple lists

Although based firmly around technological developments, the DELIVER project had a clear focus on finding a common ground in which learning technologists, librarians, and academic staff could work together to present the best experience or environment to students. As such, the project was as much focussed on changing processes and cultural attitudes as on developing new tools. The project built particularly on the co-operation that has developed between the LSE Library (http://www.lse.ac.uk/library) and the Centre for Learning Technology (CLT) (http://clt.lse.ac.uk/.) to examine the problems involved in bringing together learning technology and libraries. The CLT was established in February 2002, from an existing Learning Technology group and it is noteworthy that there has been a librarian in the team since its inception. Integrating electronic library resources into learning technology initiatives has been an ongoing brief of the team librarian, who also advises on digital copyright and co-ordinates an electronic course pack service. This service enables academics to request core readings for inclusion in their WebCT course. Items are copyright cleared, scanned and made available through the VLE. The librarian also encourages academics to link to electronic journal articles where possible. The DELIVER Project built on this co-operation and the existing level of integration between the VLE and the electronic library, to make this more seamless and to help academics make increased use of existing library resources.

The success of the electronic course pack developments within WebCT at LSE revealed some of the problems facing support for course resources. The e-course pack was included within the WebCT course as a full bibliographic list with properly supported links to the electronic resources. The CLT developed a HTML template to facilitate a more standardised approach to online readings across courses. However, some academics also included a traditional reading list in WebCT typically as a Word document or as a PDF (Portable Document Format) file, which often did not contain links to the full text. Additionally, lists of 'Web links', or free electronic resources, were sometimes included as a separate list within the course. This presentation failed

to give students a coherent overview of the resources available to support their course. In addition to this, a separate reading list system was being maintained by the library within the library catalogue, based on the information passed to the library to facilitate resource purchase.

The main problems with this approach were to do with process and ownership. In terms of process, it is very difficult to balance the needs of the reading list as a functional tool used for ordering resources, and its pedagogical application within the course. Both LSE and De Montfort University had been unable to find a coherent system for passing information from the list creator to the library in the most efficient manner. A further issue arose with the annual review of the resources included in course reading lists. The partner institutions had no coherent way of identifying which resources were new items on lists each year, and had to resort to checking each list in detail against stock. Ownership was the final problem. Each reading list within an institution needs to go through several processes:

- Creation;
- Annotation;
- Updating;
- Review;
- Presentation.

It is often unclear who is responsible for each step, and different stakeholders had different opinions as to who should be responsible. Establishing and implementing a clear process to address these issues was a key element within the DELIVER project.

5. Resource or reading list?

To address the problems detailed above, the DELIVER project started with two basic concepts:

- Any resource can be a link, although this may be to a location reference for a physical item.
- Reading lists should be referred to as resource lists, and encompass ALL course resources.

It was felt that introducing these two concepts to the stakeholders involved would help them think about the process in a different way. If any resource can be a link, it

becomes clear that the list can be presented interactively within a VLE and that certain skills are required to make these links work. By encouraging the people involved to think about resource lists, the project aimed to move away from the separation of lists and combine traditional resources, electronic resources, Web links, and electronic course packs in to one coherent resource.

With these two concepts in mind, the project staff undertook a detailed user needs analysis to try and identify the needs of all the stakeholders involved (Harris, 2003a). Work for the user needs analysis was undertaken independently at both De Montfort and LSE, because it was felt the two organisations had different structures and different focuses in terms of teaching, learning and research. Although slightly different methodologies were adopted, it was interesting to see the similarities in the findings, and the entire research was written up as one report. At LSE it was decided that several different methods would be used to collect data from the various stakeholders. Consequently, semi-structured one to one interviews were used for academic staff and WebCT course designers. This enabled issues to be explored in some depth and the interviews could be scheduled to fit into the work patterns of busy individuals. Library staff were interviewed using focus groups, of which two were held, to represent staff in a academic liaison role and staff working in the team that processed reading lists. Finally a focus group of students was also held. The students were selected from one large population course that had used WebCT to deliver a wide range of reading materials and other 'library' resources.

The methodology resulted in fairly detailed scripts from the interviews and focus groups. These were summarised and examined in detail by the project team. The comments and ideas included in the interviews were then translated into recommendations for the project. In total 78 recommendations were identified. These were subsequently classified into institutional recommendations (to be passed to relevant bodies in the partner institutions) and system recommendations that were passed to the technical development team. This process identified a series of requirements that clearly went beyond support for the core resource list element, and suggested a clear development strategy for creating a rich resource environment within a VLE. The project team divided these requirements in to four categories:

- *Resource List Requirements* – a report intended for further development and investigation by the project team.
- *Development of the VLE* – a report to be passed to the learning technology team that suggested changes to the VLE presentation and structure.
- *Software Development* – a report that suggested ways in which in-house software could be developed and applied to support resource integration within the VLE.
- *Institutional Requirements* – a report to be passed to appropriate decision makers within the partner institutions regarding cultural change.

6. Managing lists

The *Resource List Requirements* were a key outcome of the user needs analysis. During interviews and focus groups individuals had been asked to consider issues such as how they currently present their reading list through WebCT, how this might be made more straightforward, and any problems they experience. At the heart of this issue was the problem of how the library can obtain up to date information from lecturers about the items that are on their reading list. Without this information it is difficult for the library to ensure that material is available for students and in the appropriate format and numbers of copies. It was clear that library staff found it difficult to obtain accurate reading list information from academic staff. Academic staff meanwhile were often unclear about the relationship between them submitting a list to the library, and what was then actually purchased. They were also often unfamiliar with how to find out if materials, in particular journals, were available in electronic format.

After reviewing the issues identified through the user needs analysis, the project team evaluated the best way to meet these requirements through project development. It was felt that a commercial system would offer the best solution, considering the timescale of the project and the detailed requirements of the users. Therefore, as part of the second phase of the DELIVER project, the team undertook an evaluation of three distinctive resource list management software packages (Harris, 2003b). Although this evaluation used criteria identified by the partner institutions of the DELIVER project, the evaluation should be useful to a wider audience interested in purchasing resource list solutions. In selecting packages to evaluate, the team

attempted to identify three distinctive approaches to the issues surrounding resource list management:

- Talislist – a solution offered by a company that has significant experience in the management of library resources (http://www.talis.com/products/talislist/talislist_overview.shtml).
- ReadingListDirect – an independent company (Sentient Learning (http://www.sentientlearning.com) offering different approaches to both hosting and pricing of resource lists.
- Bookworm – an open source development from Loughborough University (http://bookworm.lboro.ac.uk/) and used for LORLS (Loughborough Online Reading List System).

The limited timescale available to the project did not allow for a more in-depth look at all the possible resource list management solutions, but it was felt that these three options offered a fair representation of the different approaches available.

The two partner institutions in the DELIVER project are of different size, structure and focus. As with any procurement decision, it is possible that different options may offer the best solutions to the different institutions. The three solutions evaluated were very different from each other, despite having a common set of broad requirements. Talislist is a 'traditional' commercial software product, installed and supported by a vendor, but hosted and supported (directly) by the institution/library. Bookworm is an open source software package, relying more heavily on the availability of local support and maintenance expertise within the institution/library. ReadingListDirect (now Sentient DISCOVER) is a managed service, rather than a software product, with consequently reduced technical support costs for the institution/library, but also risks associated with the outsourcing of such an important institutional function.

Through the evaluation process, and further consultation at each institution, it was decided that LSE would pursue use of Sentient DISCOVER, and DeMontfort University would implement Talislist. LSE chose to purchase DISCOVER partly because of the comparatively low cost of the system, but also because the company

agreed to convert existing reading list data which was held in the library management system. Meanwhile, De Montfort already used the Talis library management system and the reading management module could be easily installed and would be familiar to library staff. As an open source product, both institutions felt the level of support required for Bookworm might prove problematic in the long term, as any developments would need to be undertaken in-house.

One of the lessons learnt from the resource list evaluation was the importance of central content management for resource references and metadata. This has several benefits such as the ability:

- to monitor resource references across all courses;
- to centrally update information (such as changing link data);
- for course resource lists to be shared.

This implies the necessity for an additional system beyond the Virtual Learning Environment as VLEs are currently aimed solely at presentation and rarely provide content management facilities. Central resource and resource metadata repositories also aid the processing of resources across departments. If, for example, all resource list references are held in a central database it is easy for all parties to tell if a reference has recently been added. This significantly improves the amount of time spent checking lists each academic year. Such a system also allows the appropriate stakeholder to be given appropriate rights and responsibility for resource list processing at appropriate points in the process. Introducing such a system, however, does require a significant change in working practice and brings with it the need for training and communication across departments. Both TalisList and Sentient DISCOVER use a central resource repository, so that both library staff and tutors can create and edit reading lists. Both systems also have integration with the library OPAC, online journals, and support standards such as OpenURL.

7. Other relevant database developments

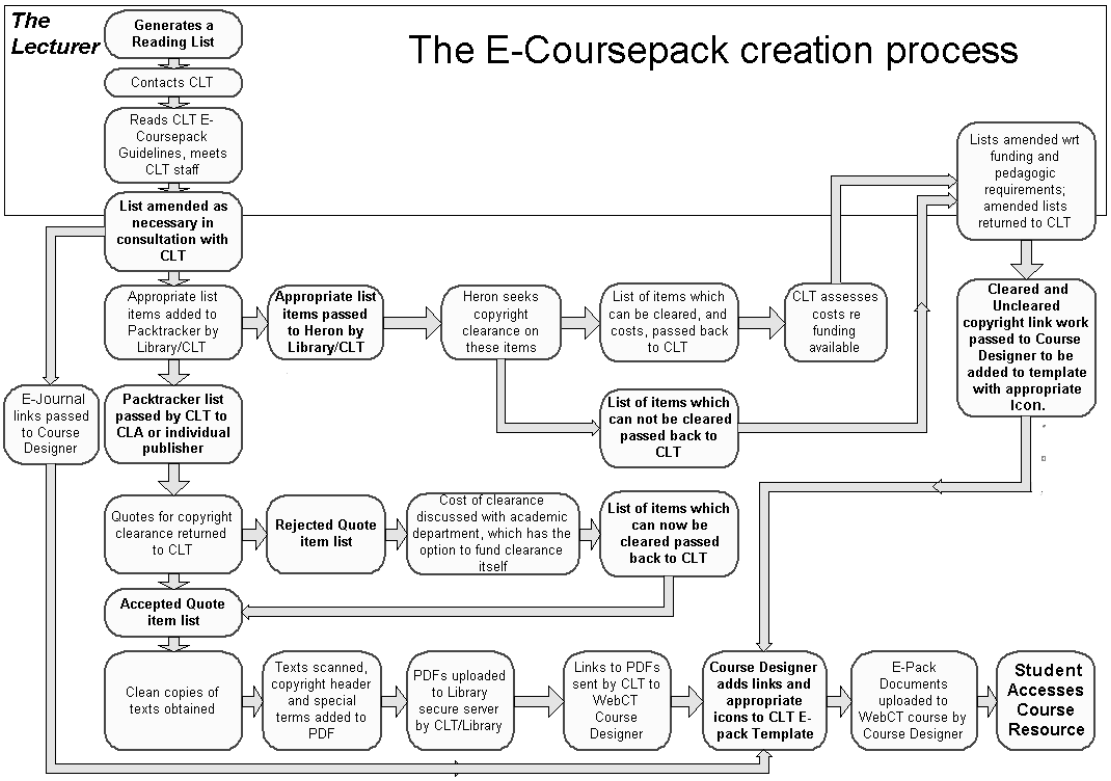
An important concurrent development to the DELIVER Project, was the development of a digital rights management system to manage the electronic course pack production process. The database, known as Packtracker, was developed for the LSE, by the HERON (Higher Education Resources ON-demand) Service, which is part of Ingenta UK (http://www.heron.ingenta.com). HERON provides a copyright

clearance and digitisation service for Higher and Further Education in the UK and part of the LSE's e-course pack services are outsourced here. The Packtracker database was based on similar architecture to the HERON database, Heronweb, which is used by institutions to manage their outsourced e-course packs. Packtracker is now available to other institutions to purchase as a commercial product (http://www.heron.ingenta.com/about/about_packtracker.html). Requests for items are placed on the system, copyright quotes can be tracked and scanning scheduled. LSE collaborated closely with the HERON Technical Manager to develop a system which manages both in-house produced e-course packs that require copyright clearance either from the Copyright Licensing Agency, or directly with publishers, and those packs which are outsourced to HERON.

While developments are still underway, having e-course pack information within a database does open up a host of possibilities as to how these resources are presented in the VLE. Eventually it is planned that live information from the database can be fed directly into WebCT courses, so that as soon as readings become available on the library server they will be displayed on the resource list. The current method relies on library staff notifying the course designer that a particular item on the reading list has been scanned and them manually pasting the URLs into the reading list. The current workflow is described in Figure 1.

Insert Figure 1:

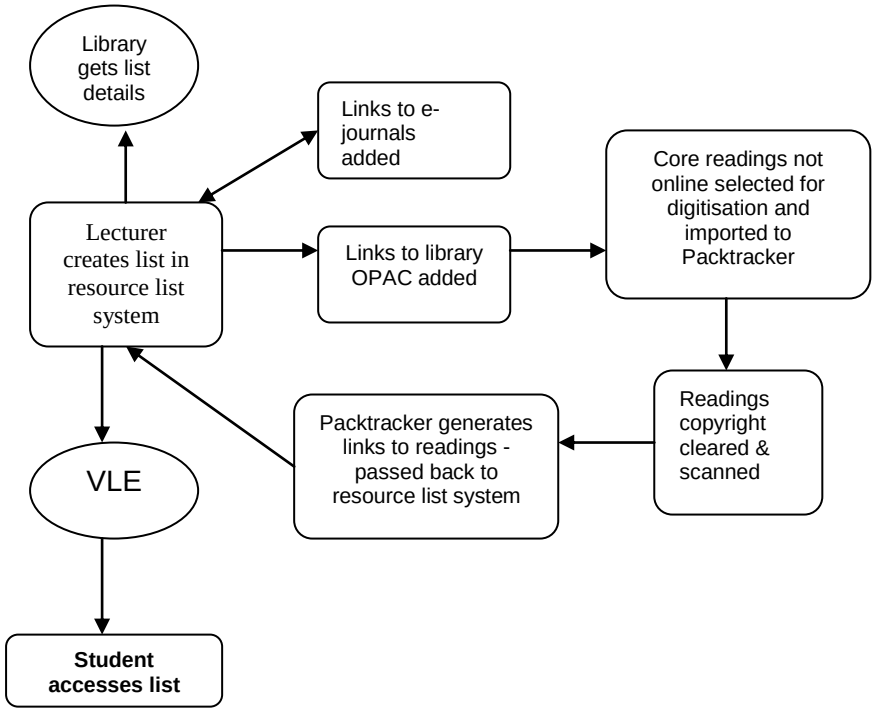
Figure 1: The E-course pack production process at LSE



A proposed workflow using a resource list system and digital rights management system is shown in Figure 2. Initial discussions between HERON and Sentient have taken place, but this work is dependant on the development of the IMS Resource List Interoperability specification discussed later in this paper.

Insert figure 2:

Figure 2: Proposed workflow using a resource list system and digital rights management system



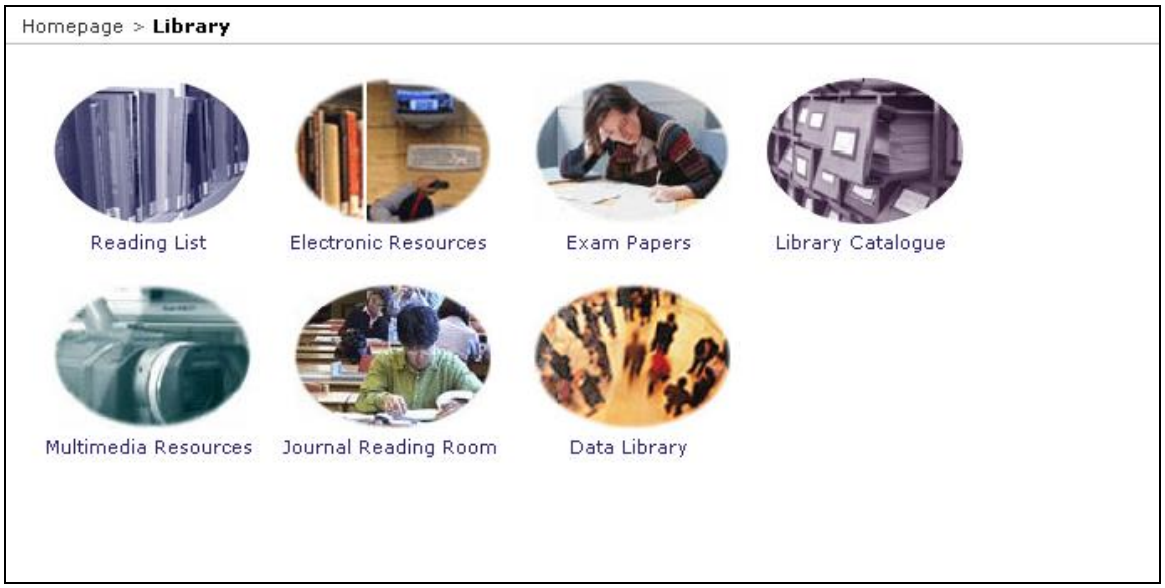
8. Addressing the environment

Throughout the interviews with academic staff the idea developed of a library area within WebCT which would provide a structure and a dedicated place to include electronic resources. The project found that the resource list was a key point at which librarians, learning technologists and academic staff could co-operate and therefore the LSE are investing effort in getting this development right. The project found that one of the main reasons academic staff didn't include electronic resources in their course Web site, was because they did not know which resources were available or how they should best present them. Using the specialist knowledge of library subject liaison staff, and working with the CLT staff, it is hoped that this problem can be addressed. The development of a dedicated programme of 'E-literacy' training for lecturers and WebCT course designers is also an important step towards addressing this issue. This programme commenced in September 2004 with a specific class to help lecturers build an online reading list. For more details see: http://www.lse.ac.uk/library/insktr/staff_training.htm

The final result from the project was a 'Library Area Template' for use in WebCT courses. This is shown in Figure 3.

Take in Figure 3

Figure 3: The Library Area in WebCT at LSE



The Library Area Template is analogous with a 'course library' allowing academic staff to customise the resources they present to students. All the icons are optional but the key areas it includes are:

- the resource / reading list;
- a link to the library catalogue;
- the journal reading room – where title level links to electronic journals can be added;
- the electronic library – where links to relevant electronic resources can be added, for example a link to EconLit for an Economics course. These are selected from the Electronic Library.

9. Subsequent developments and conclusions

Since the completion of the DELIVER Project in 2003, LSE Library has established a group to manage the implementation of Sentient DISCOVER. Representatives from the Library and from the CLT sit on the group. Reading list data has been imported into DISCOVER from the library management system and staff are working to edit the lists. A small number of lists went live to students in October 2004 and it is anticipated that training will be rolled out to academic staff over the course of 2004-5. However, progress has been slower than anticipated. Meanwhile, all new WebCT courses at LSE from 2003/4 included a library area, which can be customised by course designers to include appropriate library resources. It is anticipated that

Sentient DISCOVER resource lists will be made available through this area, in addition to being available from the library catalogue.

In the wider community, integration between library systems and VLEs has continued, for example in early 2004 Sentient launched a WebCT PowerLink. The PowerLink enables course designers to add a variety of library resources directly into their WebCT course. It will enhance resource discovery for academic staff, manage the links to learning resources, and additionally provide the library with valuable management information concerning the use of resources.

Furthermore, DELIVER and other projects in the DiVLE Programme highlighted the need for standards and specifications in this field. The Programme found that there was no metadata standard for the description of resources associated with courses within a virtual learning environment. As a direct result of this finding, the IMS Global Learning Consortium (http://www.imsglobal.org/), responsible for e-learning standards, launched a Resources List Interoperability (RLI) Charter in June 2003 and is currently defining a specification for the interoperability of resource lists between Library Information Management Systems and e-learning systems (http://www.imsglobal.org/). While we are still some way off fully integrated and interoperable library and e-learning systems, the DELIVER Project and the DiVLE Programme provided valuable experience towards achieving this goal. Moreover, the reading, or resource, list is an important tool and area of common interest between academic staff, librarians and the learning technologists and collaboration between these groups is essential to ensure future developments.

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