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Evaluating Services and Specifications for Reading List Systems

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Terms of Reference

- **To conduct a comprehensive, international literature review related to the provision of reading list systems in libraries, focusing in particular on open source projects where applicable**
- **To review current practices and implementations in Sconul and Conul Libraries**
- **To assess three reading list systems (two open source and one commercially available) in the light of current national practices**
- **To propose a set of specifications to assist in modelling and implementing systems**
- **To make a set of recommendations with regard to a nationally accessible reading list system**

Introduction

This paper considers current best practices through a literature review, examines open source and other varieties of Reading List software (notably the University of Kent, the Open University and a commercial implementation, Talis Aspire), considers their applicability to an Irish academic library environment, and proposes a framework within which the currently parallel operations of reading list management software, VLEs and LMS can develop.

Reading List software often functions as a "middle way" by mediating between Library Management Systems and Virtual Learning Environments. This research seeks to identify current practices and provisions of Reading List software.

The provision of library reading lists forms a truly heterogeneous environment in which the interests and activities of librarians, academics and students converge. For example, Library Management Systems (LMS) are typically administered by library staff , comprised of a database performing a variety of functions, and offered to patrons via discovery interfaces (OPACs) or services (Z39.50, OAI, etc.). Virtual Learning Environments (VLE) are usually administered by University or College IT and are normally populated with content by academic staff and librarians to better support online teaching and learning and are a familiar feature of the student's online academic environment. Also, as Reading Lists collocate specific course material and are typically comprised of content provided by the academic community, they are linked to VLEs. Although various mechanisms are available to insert Reading Lists into the library environment (e.g., LMS vendor dependent modules) and create links between a list and a VLE, there is still a tacit assumption that the Reading List is a separate, monolithic environment that the student will have to navigate separately from the OPAC or VLE. This lack of reusable services would not seem to mesh well with Web 2.0 generated expectations regarding modularised services in disparate environments; for example, linking readers from an OPAC when an item is not available to a bookseller, or using an openURL request that cannot be fulfilled locally to populate an ILL form.

Both rationalising and evaluating current practices, implementations and challenges identifies potential challenges in reading list services. It is suggested that developing a specification that maps the relationships between the software, services, and involved parties, would assist institutions, particularly in an Irish academic context, deploying reading list projects or developing future reading list applications. It is hoped that the development of such a specification will contribute to a novel approach, such as a semantic-web based approach or cloud-based solution which materially assists in the delivery of services and the promotion of the library.

Ideally, a reading list ought to be a flexible service that uses data from a Library's LMS while also discoverable through a VLE. Instead, Libraries are potentially left with a stand-alone system, isolated from local and University or College resources. While commercially available systems have focused on specific pieces of functionality such as methods to automate links between list items and items in the OPAC, teaching and learning institutions are increasingly turning towards open source or in-house developed alternatives. Often these systems are developed specifically in reaction to the lack of services available from commercially developed reading list systems. For example, a 2008 JISC award-winning reading list system developed by the University of Kent was developed specifically to insert services into library and other University department applications.

Investigations of themes, practices and specific software implementations were greatly assisted by attendance at three UK-based workshops during the summer of 2010 and the winter of 2011. These workshops facilitated detailed conversations with the developers of two open source reading list systems, a commercially available system and allowed local software installations for the purpose of evaluation.

Additionally, there are issues of institutional workflows as deployed in the service of reading list systems. Academics supply reading list content while library staff often manually populate and build the lists. This potentially affects both academic staff acceptance of the system (in so far as supplying list content is perceived as either onerous or duplicate of other work) and library maintenance of the system (for example, manually loading list information).

Literature Review and Themes

In the moderate corpus of professional literature that deals with reading list systems, there is a repeated sense that such systems bridge the respective provinces of the library and teaching and learning faculties. Surprisingly, both articles reporting on open source implementations and those considering open source solutions report that issues arising with regard to the systems are often as much culturally rooted as technically oriented. Additionally, there is a sense that students have become increasingly "destination-agnostic" with respect to applications like reading lists systems that are traditionally managed by the Library; students expect course reading information to be available with other course content. As Ken Chad (2010) notes, a

contributing factor towards the decline of the age of monolithic, vertically integrated library systems is the fact that they are not always useful to students.

Secondly, the professional literature contextualises reading list systems within academic environments in the pre-automated 1970s, revealing that debates about library/ academic ownership of lists, creating lists, and student use of reading lists, pre-date current discussions surrounding large-scale automated systems, open source or otherwise. One surprising find from reviewing the literature is the fact that similar themes revolving around cultural issues, rather than purely technical, are articulated in literature from the 1970s and 1980s. Much of the North American literature focuses on the notion of the E-Reserve system. E-Reserve systems are similar to reading/ resource list systems but function primarily as a container for digital surrogates of course reading material. As such, much of the literature dealing with such systems centres, almost exclusively, on issues of copyright and intellectual property. Not surprisingly, within literature on reading/ resource lists copyright issues are not a primary focus. Nevertheless, E-Reserve systems can be viewed as a precursor to the modern, automated reading list system. Indeed, some of the Library projects considered in the course of the literature review have used e-reserve modules, included as a part of the institution's Library Management System (LMS), as the initial platform for reading list systems.

Eleven distinct themes emerged during the course of the professional literature review. These themes are:

- How reading list systems are defined, including content and pedagogical models/ assumptions contained in the definitions
- How reading lists are used by various communities (students, academics, librarians)
- How reading lists integrate with other University or institutional systems
- How reading list systems help students to develop research skills
- Conversely, how such systems can hinder the research process
- How reading list systems are affected by inter-organisational relationships between library and academic staff
- How cultural differences play as large a role as technology in the implementation of reading list systems
- How data is brought into reading list systems
- Open source and vendor-supplied systems
- Key specifications for reading list systems
- What types of additional functionality help to characterise reading list systems as more modern, Web 2.0 applications?

Reading list systems are generally defined in the literature as software applications that mediate between the library, academic staff and students. Jones (2009) suggests that reading lists comprise an area where academic workflows, student needs and library services interact. Similarly, McCormick (2006) writes that reading list systems can be viewed as a communication medium facilitating interactions between lecturers and librarians.

The role of reading list systems as operational tools for libraries is discussed in the literature. Jones (2006) suggests that for libraries reading lists are a major driver of circulation policies and collection development and that the key aim of reading lists is to promote awareness and use of electronic material. Jones (2006 p. 21) writes, "Reading lists are documents created and maintained to direct use of resources, used to obtain resources, and to make decisions about provision of access to resources. Lists have a scope, a structure, content and a status. Not all of this information has to be explicit in a list, but all of it can be implied." This characterization of reading lists as a tool for generating and consolidating library operational functions finds an analogue in Austin's (2002) observation that the emergence of e-reserve systems in North American libraries during the 1980s paralleled a shift in emphasis from the librarian as a guardian of information to a manager of information.

Secker (2005 p.41) describes the reading list as "one of the most important resources for any course of study in UK HE." Secker positions the reading list as unique among teaching and learning resources by virtue of the fact that such resources are significantly enhanced from other pedagogical resources by notes, explanations and commentaries. Stokes and Martin (2008) foreground the construction of lists as something occurring within the unique constraints of academic norms. The authors note:

> "There are thus indications that tutors were constructing their reading lists from a range of influences. As such, we would argue that reading lists are brought about through a series of socially constructive processes intertwined with tutor personal learning journeys, the influence of educational macro-policy, institutional validation and curriculum design. This is not acknowledged in the literature, nor necessarily through policy influences" (Stokes and Martin 2008 p.118) .

Just as reading lists are often defined in the literature as a mediating technology between students, academic staff and the library, they are often defined as embodying specific pedagogical models. For example, Akeroyd (2005) describes a spectrum placing academic content with structured, standardised material controlled by peer-review at one end and "loosely structured knowledge bases" at the other end. Characterising reading lists as "notoriously static documents" Akeroyd would seem to position them at the former end of his spectrum. However, Akeroyd (2005 p.164) also notes, "the opportunity to create a dynamic, shared and annotated list, as a bridge between resources and learning, is one which, in the end, may prove to be more critical than many other developments we have noted previously." Beard and Dale (2008) note links between critical thinking, autonomous pedagogical learning and success.

Lastly, the mediating role assigned to reading lists extends from the types of people using the system to technology as well. Jones (2006) maintains that such systems should link list data to other university systems and data sets, as well as the VLE, the LMS and the student registry system. This theme is examined separately below.

Uses of Reading Lists

The professional literature describes the uses put to reading lists by the three primary stakeholder communities: students, academics and librarians. Chad (2010) opines that reading lists provide a coherent way to fill the need for students to access course resources and a back room system for the library to manage resources and licenses. In general then, three uses can be matched to each group. Students use the systems to identify and find resources. Academics use lists to assist students in developing research skills. Librarians use the systems, as a "back-of-house" operations tool, to manage stock and for collections development.

Rowley et al. (2008) have indicated that for students a divergence between expectations and actual academic experience can signal academic disengagement. Echoing a similar theme, Maher and Mitchel (2010 para.2) write that "expectations about study requirements and appropriate or adequate workloads at university were marked by confusion and the students indicated that they did not really have clear perceptions about what was expected of them and what was required for successful study." Maher and Mitchell identify three areas as important for students in their study experience: lack of clarity about workloads, lack of guidance on necessary reading and misidentification of assessment tasks. Thompson et al. (2004) report that students use lists to counteract these types of frustrations and disengagement as a guide for modules. In a survey conducted at Wolverhampton Business School, Thompson et al. discovered that the majority of students use reading lists for modules and that the most popular choice of items was core or essential texts. This would seem to suggest that reading lists often serve a proscriptive and defining function for students. Masson (2009) claims that library services are contextualised in the online environment in four ways: on the institutional level through library homepages; on the subject level through subject resource web pages; on an individual basis through "My Library" account pages; and on the course or module level by reading lists. In terms of the services offered by the Library to the student, reading list systems would seem to be of primary importance in terms of teaching and learning.

Reading lists are used by academics, as noted above, to create unique pedagogical resources that combine collocation of materials, access to materials (in the form of electronic linking) and commentary on the material (notes, etc.) Stokes and Martin (2008 p.113) note, "Reading lists are generally expected by tutors to operate as a key indicator of materials for students." In summarising the main interests of academics in reading list systems, Jones (2009) notes that faculty use lists to direct use of resources in support of teaching and learning, want relevant lists easily accessible to students and want list creation and maintenance to integrate with other tools and workflows.

Jones identifies slightly different uses of lists among librarians; chief among these is stock management. The areas identified by Jones are informing provision of access, compare reading list content with holdings and the production of management information system (MIS) reports based on reading list use. Similarly, Uhomoibhi et al. identify a specifically MIS-oriented

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component of reading lists by claiming that information from resource management systems can be used to inform the Library's resource management strategy.

Integration of the Reading List System

A recurring theme in the professional literature is integration of the reading/ resource list system with other University systems and services. Chad (2010 p.5) has noted the diminishing value of the library management system (and by extension, reading list systems) as a destination for students. Chad writes "systems are increasingly in the cloud where the aggregation of data creates Google-like opportunities for 'collective intelligence'. User-generated resource lists might arise that compete with the formal institutional lists." Likewise, in considering the promise of web services to assist in the creation of reading list systems, Chad (2005 p.3) writes, "Perhaps librarians would no longer have to re-key reading lists? Perhaps the VLE, the LMS and other associated authentication and linking systems could be coupled together by standard web-based services."

While Chad does singularly focus on innovative library services, a pervasive theme in the professional literature is the lack of integration between the reading list system and other University pedagogical applications, in particular the Virtual Learning Environment (VLE). Virkus, et al. have identified a number of issues in integrating VLE and library services, including metadata, openURL services, user interfaces, personalisation, copyright issues and reading list management systems. It ought to be noted that such systems in particular are singled-out in barring such integration. Beard and Dale (2008 p.104-105) report that reading lists are used more often after their inclusion among VLE resources, characterising them as "part of a directional package on a route to resource discovery." Uhomoibhi et al. (2003) note that the integration of library resources within the VLE means that the library is not bypassed.

As noted above, reading lists often mediate between communities of practice, such as librarians and academics, within the University. Similarly, the systems themselves provide a link between applications - for example the LMS and the VLE. Akeroyd (2005) claims that as shared and distributed systems, reading list systems provide a direct link between what are often viewed as competing systems, specifically the library catalogue and the VLE. Indeed, Ubomoibhi et al. (2003 p.3) opine that such integration "can simplify user education, increase usage of electronic resources, reduce help-desk queries and streamline library business processes."

Describing the semantic-based approach taken in developing Talis Aspire, Clarke and Grieg (2009) relate that integration with other systems was a key concern in Aspire's development. The authors write that integration with University portals and VLEs constituted only a part of their vision for the system and that data within the system could potentially link with a much wider range of web-based systems and services, leveraging relationships to resources outside of the traditional academic environment.

Developing Research Skills

While students highly value the directional focus of reading lists, relying on lists for core and essential texts, there is evidence that using reading lists assists in the development of research skills. Particularly in the electronic/ automated context, assisted by annotation and commentary, lists can become dynamic, rather than static, resources and help students in amassing the set of tools necessary for research.

Maher and Mitchell (2010) describe the effectiveness of dialogue with students to enable them to identify and acquire the skills necessary for research. The authors (Maher and Mitchell 2010 para. 22) write, "findings also indicated that these students were willing to enter a fuller and more complex dialogue about learning, which offers an important shared objective for students and their teachers. Direct talking about skills, readings and assessment tasks might facilitate shared reflection on broader aspects of learning." The reading list constitutes an element of this dialogue, which through lecturer annotation and notes assists students in clearly identifying expectations about reading.

Rowley et al. (2008 p.410-411) identify a relationship between reading lists and preparedness for study, citing an example where university tutors said "they constructed reading lists with the aim of helping students to become more independent and critical in their reading as they progress with their studies." Markland (2003) expands upon this notion of the reading list system as having an instrumental function by maintaining that within an electronic environment access to a broad range of heterogeneous media types means that the academic can cater reading lists for specific students or groups of students. These heavily customised lists can then be inserted for further student consumption within a VLE.

Masson identifies a role for reading lists in the research context. Reading lists can orient new researchers and research students in particular subjects areas. Again, specific weight is given to these systems within an electronic context. Masson writes

> "The emergence of collaborative resource list tools that support the development process and user tagging will transform the utility of the resource list form a static reference tool to a scaffolded learning support activity. The availability of user generated information such as perceptions of the relevance of the resources and the status of engagement (intention to read, reading, etc.) will provide a rich information framework for users and librarians" (Masson 2009 p.223).

Conversely, reading lists are sometimes characterised in the professional literature as providing a too-easy context for accessing information and thereby actively hindering student research skills. The claim is that reading list systems can lead to a "spoon-fed" effect. For example, Akeroyd (2005) claims that, as discussed above, pedagogical and conceptual models are implicit in any system. Depending on the model deployed, systems can roughly promote a "knowing what" or a "knowing how." In offering direct, mediated access to a variety of resources,

how far do reading list systems go in promoting the "knowing how" of conducting research and resource discovery?

Markland (2003) laments the fact that the ease of access to resources by reading lists does not necessarily provide the skills that might make students' research skills more successful in more challenging online environments. Similarly, Stokes and Martin (2008) ask whether in providing easy sorts of access via technology whether reading lists spoon-feed students and actively discourage learning research methods. Beard and Dale (2008 p.100) wonder whether reading list systems engender a too-passive relation to information resources, suggesting that "rapid and easy access to information may be to the detriment of developing academic skills of creative and independent thinking." Beard and Dale further note "concerns from both academics and librarians that strategies are needed to develop autonomous learners and avoid spoon-feeding."

Clearly, in so far as reading list systems generate static, stand-alone lists, there is are risks of both student passivity and note developing research skills. However, as both Masson (2009) and others note the emphasis of reading list systems does shift within a VLE context from a "flat" listing of resources to a more dynamic, engaged sharing of information.

<u>Interorganisational Relationships and Cultural Differences</u>

A common theme in the professional literature emerges around the relationships between library and academic staff, cultural differences between the groups and how such relationships and differences affect the provision of resources through reading list systems. Anecdotally, much of the literature addresses questions of list ownership and responsibility. Do the academics who produce lists or the librarians who often maintain the lists own lists? Who is responsible for metadata, librarians or academics? Are reading list systems primarily library applications and do they therefore privilege the library perspective over the academic? One perspective is offered by Jones (2009 p.12) in his summation of the academic's role: "Academics are the drivers of reading list systems in that they actually create and maintain reading lists. Without widespread academic participation any standard system would fail."

In listing the issues identified in integrating VLEs and library services, after enumerating a number of technology elements, Virkus et al. (2009) alight on six cultural barriers to integration: issues of institutional infrastructure and politics, inter-professional communication and collaboration, resources and funding, teaching and learning (e.g. different teaching styles resulting in information overload, staff development, access and content). The first two issues listed (infrastructure and politics, communication and collaboration) ought to be singled out in particular. In evaluating reading list systems at Cambridge, Jones (2009) found that the major issues surrounding reading lists tend to be institutional rather than technical.

In evaluating reading lists in terms of staff and student expectations, Stokes and Martin found that while such systems are typically only addressed in terms of technology, there are actually social and cultural issues too:

"Yet, reading lists have been largely overlooked (in relation to better appreciating cultural, sociological and behavioural aspects of higher education), acknowledged only in the briefest manner as functionally valuable in the face of enhanced technology. If we begin to develop a more complex appreciation of reading lists, then a range of issues can be seen to be at play for both tutors and students" (2008 p.123).

One of the major barriers to staff uptake of reading list systems, is a perception, by academic staff, that such systems are unfairly weighted in terms of the library. In evaluating an open source reading list system at Loughsborough University, McCormick (2006) details how lecturers felt that an disproportionate share of administrative duties, in respect to the system, devolved to them. These administrative tasks included data entry and list maintenance. McCormick describes how academics felt they were support staff for the system rather than equal contributors. Scheduling conflicts can often create a perception that an academic is subordinate to the library. For instance, academic staff produce reading lists on an annual or semi-annual basis, often providing lists of required resources to the library at the start of a term. Librarians, on the other hand, often work according to different business processes and schedules, and might require academic input at different times of the year. Markland (2003) specifically discussed this mismatch of library and academic business processes. Markland outlines how library staff, in order to post reading lists and order items in a timely fashion, often requested resource lists from lecturers far in advance of the start of term. These requests were a continuous cause of tension between academics and the library. Markland (2003 p.90) remarks, "if the intention within an institution was that the library would manage all online reading and resource lists within VLEs, then greater flexibility would be necessary, which would impact upon the job roles of library staff."

In addition to perceptions of imbalance of power, other areas denoting cultural differences include, the tension between the list as a stock tool for library purposes and as the personal project of an academic, lack of coherent systems or workflows to create lists, and academics not knowing what technology is available in reading list systems or not knowing how to use the technology (Secker, 2005).

The literature does propose a number of approaches and methodologies to assuage these differences in organisational relationships and cultural barriers. Markland (2003) suggests that new reading list systems can herald new ways of staff working together, citing the use of new tools as a way to change older working habits. Poleykeet and Been (2007) describe how organizational changes in the library contributed towards the success of the University of Western Australia's reading list system. For Loughsborough University, McCormick (2006) identifies the key issue in reading list development as proactive and mutual dialogue between the library and other departments. McCormick lists the following keys to successful library/academic partnerships: shared vision and unique purpose, concrete goals and objectives, collaboration seen as mutually beneficial, clear roles and policy guidelines, flexibility, and open communication. Jones (2009 p.9) suggests that the reading list system should act as a "conduit for communication between various groups and institutions in the University. As such the

system should not only improve the student learning experience, but also provide a communications framework.

List Creation

Chief among the "holy grail" of reading list system functionality is automatic list ingestion. This means that a list would be created once, by academics, imported into the system, and used many times (for example, within university module descriptors, VLEs, library resources, etc). A persistent theme - and one which intersects with many of the issues discussed above, in particular organisational tensions - is the manner that data is treated by reading list systems. In general, data input is treated as a manual process in reading list systems. In practical terms this means that, depending on institutional workflows, academics must re-enter lists multiple times in multiple systems. For example, a copy of a list might be required for a module description, another copy required for a VLE and a third instance of the list might be input into the reading list system. Any project descriptions - be they vendor supplied systems or open-source varieties - include some element of manual data input. This inevitably leads to issues that affect organisational relationships and overall adoption of the system.

Chad (2010) describes the frequent manual intervention of lecturers when creating new lists. Stopforth (1994) detailing the efforts of library staff in the University College of North Wales, Bangor to obtain course reading lists describes a labour-intensive process on the library's end as they coordinated the entire process. Although the project constituted a change in library workflow and enabled better management of library stock it did involve manual keying of all reading lists. In developing and implementing an open source system at Loughsborough University, Brewerton and Knight (2003) detail how the wide variety of list formats made the import of word processing-based documents impractical. Effectively, this transferred into the hiring of six temporary staff who spent 4 months keying 857 reading lists. In reviewing the JIBS Workshop on Resource/ Reading List software held in Oxford during October 2004, Francis Boyle (2004 para. 8) reports that "a common thread through each of these case studies was that, in reality, it was the library staff who were inputting and creating the reading lists." Likewise, Uhomiobhi et al. (2003) note the challenges surrounding creating and maintaining over 5000 lists at the University of Ulster. Similar issues are documented by Poleykeet and Been (2007) at the University of Western Australia, Jones (2009) at Cambridge and Sherwood and Lovecy (1997) in Wales.

An issue related to handling list data is obtaining list information. Again, much of the literature details protracted processes and workflows where the library attempts to get reading lists from academics. Secker (2005) describes the dilemma of obtaining lecturer list contributions as the "heart of the issue" in reading list management. Poleykeet (2007) does wonder if a link between the reading list system and the VLE was established whether staff could manage content in a central location, without duplicating efforts in multiple systems. Interestingly, McCormick (2006) suggests that there is an historical issue, borne out through a review of literature dating from the early 1990s, with obtaining lists from academics, that predates automated systems. Jones (2009 p.5) writes that "the main problem with the current situation is not the functionality (or lack

of) supported by any particular way of handling reading lists, but the lack of a standard way of handling them."

Clearly, issues of data handling by reading list systems constitute institutional business process and workflow issues as much as software functionality. It should be stressed that this is a key issue within such systems affecting the provision of services to students, inter-organisational relationships within the institution, and how data relates is linked to similar forms of data within the university context.

Purchased or Open Source

A small percentage of the professional literature engages directly with reading list software developed under the various open source licenses. A number of JISC-funded projects have developed reading lists systems released as open source - most notably the List8D project at the University of Kent, Telstar at the Open University, and LORLS at Loughsborough University (the first two of which are evaluated below) - but primarily UK and Irish universities utilise vendor-purchased reading list software. Indeed, at the time of writing, Kent has opted to retire Lst8D as its reading list software and implement Talis Aspire (Raper 2011).

Also, most North American open source projects focusing on this area of functionality have focused the development of e-reserve software. Which is historically divergent from reading/ resource list software in a number of ways, including a decided focus on issues of copyright, and storing rather than linking out to electronic material.

Nevertheless, a number of interesting issues arise in the professional literature with regard to open source software. Brewerton and Knight (2003) sketch a brief history of the Loughsborough Online RL System (LORLS), perhaps the longest standing and most pervasive of the UK-based open source systems. The system was created and implemented after evaluating a number of commercial products and primarily addressed issues of including academic annotations and rendering lists in multiple views (alphabetically by instructor, by course, etc.). Interestingly, McCormick's (2006) thesis discussed LORLS three years after its release and identifies the cultural/ behavioural issues discussed above. McCormick does observe that although use of the system doubled the use of reading lists it also significantly increased processing workloads for staff (given the reliance on manually-based workflows as discussed above).

Secker (2005 p.45) identifies some issues with implementing open source products through a joint project of the London School of Economics and De Montfort University: "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." Likewise, in discussing the development of an open source e-reserves system, Wynstra (2005 p.80) writes, "over the full life cycle of a computer software project, maintaining the system takes more time than developing the original system." Also, in debating the pros and cons of using open source software, Wynstra cites the lack of support and expertise required for configuration as drawbacks to implementing open source systems.

System Specifications and Additional Functionality

The professional literature is extremely useful for identifying key system specifications and areas of functionality. From the foregoing review of the literature a number of key functional areas emerge. These include:

1. Integration of the reading list system with other University applications, particularly the VLE
2. A mechanism to automate the process of list creation or business process re-engineering that addresses data ingest and creation
3. Collaborative or dynamic elements allowing student and staff mark-up of lists

These functional areas directly address a number of the issues raised by the professional literature. For instance, area 1, technology integration, ensures that the uses put to reading list systems by various stakeholder groups (students, academics, librarians) are adequately and thoroughly addressed. A system that produces lists accessible through a VLE means that individual lists are tightly bound to module content; the same system connected to a university finance system ensures that the library can manage its stock and finances. Functional area 2, list creation, addresses cultural and organisational behaviour and, possibly, makes the system more "discipline neutral"; for instance, academics might not perceive the system as weighted in favour of the library in terms of work loads. Finally, area 3 approaches some of the pedagogical issues implicit in the system itself and how it exposes data (the "knowing what" and "knowing how" distinction) and implicit in student use of the system.

Though specific system specifications are discussed in more detail below, some additional points of relevance emerge from the professional literature. Clarke and Greig (2009) discuss the key benefits of using a semantic web-based framework to house a resource list system (Talis Aspire). Some key elements discussed by Clarke and Grieg are interoperability with other systems, a simplified "drop and drag" editing interface, and re-use of list data for recommendation systems. Usage statistics are included in the system and can be used to feedback into stock management decisions. Similarly, in McCormick's review of the LORLS system (2006) a main component is the recommendation that the system be augmented to include LMS circulation data and recommendations features.

Wynstra (2005) includes details for functional requirements used in the development of the open source Web Course Reserve System. Notable in the requirements are separate details for the student, academic staff and administrative (library) interfaces.

Current Implementations

In general, when considering a reading list system, institutions are faced with five choices: the purchase of a stand-alone system from a vendor, development and implementation of an in-house system, implementation of an open-source system, developing a custom connector to other University systems such as the VLE and using the LMS to match desired functionality.

In terms of vendor supplied systems, the field is quite limited. Talis Aspire currently constitutes the only stand-alone system for purchase in the UK and Ireland. Alternatively there are a number of North American e-reserve products (typically integrated with an LMS and described below). While these products lack some of the functionality expected from reading list systems described previously (integration with VLEs, etc.), a certain amount of the product development is dedicated to intellectual property and copyright clearing mechanisms. Arguably, e-reserve systems can be viewed as digitised photo-copy collections and lose some of their relevance n the contemporary landscape of pervasive, publisher-supplied electronic surrogates and resource discovery via openURL and metasearch.

A number of UK institutions, such as the University of Leeds and the London School of Economics, have opted for in-house reading list solutions. While such solutions potentially satisfy the complete range of local needs and requirements, in-house expertise and dedicated staff time for maintenance are prerequisite resources. On one hand, a locally developed system fully accommodates an institution's policies, procedures and local idiosyncrasies. On the other hand, it amplifies Wynstra's claim discussed above that a library can expect to spend more time maintaining a system than that spent during the system's initial development.

Open source systems do present a viable alternative to purchasing software through a vendor or taking the in-house development route. Two examples are examined later in this paper. A number of high-profile projects have merged in the UK during the past ten years including Loughsborough's LORLS project, List8D, Telstar at the Open University and Sir Louie at Oxford. The obvious gain of implementing an open source product is the possibility of both quick implementation (in comparison to the lengthy development cycles required for in-house development) and customisation. Again, such an approach requires in-house software development expertise. Arguably, some open source solutions can be viewed as in-house projects released more widely under an open source software license. While such systems may have met the specific requirements of the developing institution, they may require considerable amendments to meet other institutional needs.

A number of UK HE institutions have developed local reading list solutions that are effectively custom integrations with the VLE. The clear benefit of such an approach is that it gives a concrete example of Uhomoibhi's assertion that the integration of library resources with the VLE means that the library is not bypassed. The approach would carry some of the same caveats pointed to with regard to in-house development though; such work requires a strong internal staff knowledge base.

Given the prevalence of e-reserve systems in North America and the dominance of the LMS market with primarily North American based vendors, some institutions have opted to use the LMS as a reading list system, either utilising e-reserve modules or setting up specialised OPAC functionality. While such an approach is advantageous in the sense that it leverages technology already existing in the library, the lists themselves are not very discoverable or visible and risk exclusion from the VLE. It ought to be stressed that none of these five solutions mentioned have tackled the issue of data importation and list creation.

With the acquisition of Talis's library division by Capita in 2010 and the discontinuation of its reading list product Talis List in June 2011, no Irish HE institutions currently deploy a standalone reading list system. Talis Aspire, the semantic web-based product, has not been used to date within Ireland. Although the Irish HE library sector should be queried with a detailed survey and questionnaire, it can be assumed that a variety of local solutions accommodate institutional approaches to reading lists. Figure 1 shows the breakdown of VLEs and among IUA members and DIT.

Institution	Reading List System*	VLE
Dublin City University	—	Moodle
Dublin Institute of Technology	—	Blackboard
Trinity College Dublin	—	Blackboard, WebCT, Moodle
University College Dublin	—	Blackboard
University College Limerick	—	Moodle
University College Cork	—	Blackboard
NUI Galway	—	Blackboard
NUI Maynooth	—	Moodle

*N.B. "Reading List System" denotes the use of a standalone application and does not take into account the use of the VLE or LMS for reading lists.

Figure 1 - Deployment of Reading Lists Systems and VLEs at IUA Libraries and DIT

Appendix 1 lists a subset of 186 UK HE institutions and is derived from a listing on the Higher Education and Research Opportunities in the UK (HERO) website. The appendix lists 37 institutions that specifically indicated the use of a reading list system, or 20% of the total institutions (16% excluding those indicating the use of the VLE/ LMS for lists). The UK market share is predominantly Talis, with 43% of those deploying reading list systems using a Talis product. It should be noted that it is unclear what institutions indicating the use of Talis List are

currently using. One interesting observation that emerges from this listing is that, at the time of response, only 1.6% of the institutions note the use an open source system. At least one of the systems - List8D - has been discontinued in production use at the University of Kent as of July 2011. An obvious question resulting from this minimal uptake of open source reading list systems is whether this is reflective of the overall systems landscape.

Events & Software Evaluation

The ANLTC bursary allowed me to attend three in events in the UK that set the context for some of my thoughts around reading lists and enabled me to evaluate three reading list systems, two open source (List8D and Telstar) and one commercially available (Talis Aspire). The events were a Linked Data and Libraries meeting held in the British Library on 21 July 2010, the Reading List Hackday, 22nd/23rd July 2010 in Cambridge, and Open Edge - Open Source in Libraries 25th-26th January 2011. While, tentatively, one might characterise open source systems as not mature enough for wide scale, multi-institution deployments and requiring a level of technical expertise not always available at the institutional level, both the functionality offered and methodology used in developing open source products are prescriptive in considering reading list systems.

More significantly, one recurring theme in each of the events was the use of semantic web technologies and linked data. Potentially, semantic web technologies address a number of the issues revealed by the professional literature, most notably, integration with other systems, data handling/ list creation and system specifications/ functionality. Briefly, the semantic web adds machine processable meaning to World Wide Web documents. It does not replace, but rather extends the current web to a web of data. What is done every day by web users is formalised - in the sense of making meaningful connection among data. Semantic technologies make it possible for machines to do this work. Lee et al. (2001), write "the Semantic Web will bring structure to the meaningful content of Web pages, creating an environment where software agents roaming from page to page can readily carry out sophisticated tasks for users." Essentially, content, included in current web technologies as human-consumable data, is rendered machine processable by semantic technologies. Linked data is a subset and ancillary service to the semantic web, where semantically tagged data is consumable by other systems. For example, the BBC Music website automatically retrieves biographic data for musical artists from dbpedia (a semantically enabled version of the wikipedia data set) and integrates the content on its own website based on semantic tags embedded in the pages.

So, in the context of reading list systems, for example, semantically-enabled pages would enable the recognition of reading lists as reading list data, across institutional systems, and allow further manipulation of the data - insertion into VLEs, recommendation systems, etc. The five key technologies involved in deploying semantic systems are explicit metadata, ontologies, logic, inference, and intelligent agents. To date this work has already been advanced for reading list systems through two formal ontologies the Reading List Ontology (http://vocab.org/resourcelist/schema-20080519.html) which defines properties for academic reading lists and the Academic Institution Internal Structure Ontology

(http://vocab.org/aiiso/schema-20080514) which defines institutional hierarchies that might be deployed through the construction of reading lists. Returning to the three specific issues of data migration/ data handling, integration with other systems, and system specifications, the issues are potentially handled in turn by ontologies and data definitions assisting in the ingest of lists, machine-processable data facilitating integration with other systems.

The Linked Data and Libraries event sponsored by Talis at the British Library, underscored and contextualised a number of the issues described above. Significantly, the talks given at the event grounded the concepts described above in terms of library data and the specific requirements of libraries. For example, the Bibliothèque nationale de France discussed building a web service using linked data to associate all bibliographic works and services. The BnF not only publishes its bibliographic data as linked data, but consumes a variety of data sets itself; for instance, not unlike the case of the BBC Music website, dbpedia is used by the library to construct authority records. The BnF offered some specific examples of transforming MARC to RDA, in turn transformed to RDF, the semantically-enabled format for exposing bibliographic data as open data. Expanding on this theme, the British Library discussed its project to release its entire catalogue as linked, open data. Specific examples were given of transforming MARC data into machine-processable, semantically-ready web pages. Like the BnF and BBC, the British Library makes use of other linked data sets, such as the Library of Congress Authority File, to augment its own records. In relation to the theme of inter-organisational relations and cultures discussed in the professional literature, the British Library described its motivations for releasing its bibliographic data as linked, open data. Though discussed in the context of public service and the state sector, much of the British Library's points are especially cogent to the University and higher education sector. Chief among the reasons for exposing its data was the argument that making data available creates wider benefits for a variety of stakeholders. The primary benefit of open data sets lies in the possibility of data re-use and eliminating the need for recreating data. A further set of arguments centre around user-generated or other linked data sets being used to augment the exposed data set; this raises the possibility of a variety of value-added services being added to the original set of data. The application of such ideas to reading list systems is easily envisaged: both raw list data could be shared across institutions for the construction of future lists and for integration into a variety of systems - outside of the library and reading list context.

The Reading List Hackday in Cambridge offered a pragmatic view into the world of contemporary reading list systems software. The event, sponsored by UKON and JISC, highlighted two recent JISC-funded reading list projects, Telstar and List8D, and showcased a number of commercially available products ranging from full reading list systems (Talis Aspire) to web services and application programming interfaces (APIs) used to enhance reading list systems to services accessible via publishers. The two-day workshop built upon a number of themes explored at the British Library, most notably the possibility of linked services and intra-system integration. For example Mendeley (http://www.mendeley.com/) , a reference system for articles and pdfs, offers an API that can potentially be used within reading list systems to create recommendations and exploit social network like data regarding academics and scientists. The format of the workshop included a half-day introduction to each of the systems and services

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followed by a day and a half practical hands-on project. The approach of the workshop organisers - grouping librarians, programmers, academics and people from industry to work on a short project - is notable. I participated in a group that constructed an application that built a reading list using APIs to openly available data (the Open Library and OCLC) and then used ISBNs and other unique identifiers to link the lists to social data regarding item use drawn from both Talis Aspire and Mendeley. The brief project underscored the notions of integrating reading list data with other systems and automating some of the manual processes used in list creation.

The Open Edge-Open Source in Libraries event similarly combined presentations about various library open source implementations with hand-on practicums. The first day commenced with a series of talks about library discovery applications and linked data in libraries. Although specific examples of reading list systems were not addressed, the two library discovery systems described - VuFind and Blacklight - are capable of integrating a variety of library content, including catalogue, digital library and reading list material. The presentations focused on aggregating different systems and accordingly do have some resonance with the issue of integrating reading list system data.

The second day focused on larger issues regarding open source software deployment in libraries. A key area of focus was whether open source products provide a viable solution in the higher education sector. A 2008 joint JISC/SCONUL report on open source LMSs (http://www.sconul.ac.uk/news/lms_report/lmsstudy/) characterised open source in libraries as "immature." The report served as a starting point for the discussion. Interestingly, one of the key findings of the report was that reading lists should be fully integrated with VLEs and the LMS. A commentator in the report notes: "What could really help is, for example, a model for a borrower or a reading list schema we can all share." Also, the report recommends utilising an existing service for reading list systems, which, rather than serving as a stand-alone product, can directly integrate with a number of other applications, including the VLE and LMS. Additional issues raised during the morning's discussion were the motivations, benefits and challenges to using open source software.

Evaluation

Three of the reading list systems reported on during the Reading List Hackday in Cambridge were evaluated in terms of system functionality, integration with other systems, data import/ handling, user interface (how well the system accommodates some of the uses out to the system by various user groups as described in the professional literature) and other elements. The evaluations were done after installing, where possible, the system on a local virtual Unix environment. It should be noted that these evaluations were by no means exhaustive, but rather investigative installations. The evaluations were not conducted with student, academic or library staff participation. The respective software's ability to connect to other applications such as VLEs was not confirmed through the evaluations; the functionality, rather, was evaluated through a review of system documentation and a review of the local installation. The three systems evaluated were List8d, Telstar, and Talis Aspire. List8D and Telstar were installed on

local virtual machines using the Ubuntu operating system. For the purposes of evaluation, access was given to talisaspire.com, a web-based version of the Talis Aspire Campus software, currently in closed beta testing. This web accessible version does not contain all of the functionality available in that of the full version. Both List8d and Telstar are available through open source licenses; Talis Aspire is a commercially available solution. The evaluations considered whether the system can be integrated with other University systems, ease of adding new lists, and user interface features for students.

List8D is a LAMP-based (Linux, Apache, MySQL, PHP) reading list system developed and used by the University of Kent from 2009 through 2011. Development of the software was funded through JISC. The software is currently supported by PTFS Europe, a commercial vendor supporting open source library software. It should be noted that the University of Kent has stated that it is no longer using or supporting List8d, but rather, is investigating a migration to Talis Aspire. List8D is well-documented and easy to install. The fact that it runs on a LAMP platform means that its infrastructure consists of commonly-used software components. The system integrates with the Moodle VLE through a set of APIs. While it might be possible to integrate the system with other VLEs, it would entail significant development work. List8D does integrate, to some extent with publisher aggregators like Blackwell and transmits orders. The system employs custom connectors called "Metatrons" to integrate with systems such as Amazon, Google Books, and local library catalogues. The system is easily integrated with a number of library catalogues, via Yaz, an open-source Z39.50 tool. For evaluation purposes, the system was configured to search a Talis catalogue and add items to lists based. While item data for lists can be generated from vendor websites such as Amazon or local systems, the list creation process is largely manual. Students can export citations to a variety of reference managers, but there is no provision for student annotation of lists. Overall, while the system is integrated with Moodle, it lacks the flexibility necessary for implementation over a range of systems deploying a variety of applications. Lastly, the user interface exposes data in a sequence of flat hierarchical lists, which might make discovery difficult for students as it does presume that students know where to traverse within lists to find the applicable resources.

Telstar was developed under a JISC-funded grant for the Open University. Similar to List8D, Telstar operates within a LAMP environment and utilises widely-supported technologies. Also, Telstar integrates with the Moodle VLE. However, Telstar does diverge from List8FD along a number of functional trajectories. Rather than making use of APIs, Telstar integrates with Moodle via RefWorks reference management software. There are a number of drawbacks to this approach, in so far as the integration is dependent on a third-party tool, rather than the more configurable (in the sense of using common webservices and HTTP POST/GET requests) List8D API deployment. Secondly, Telstar relies upon, and assumes, the use of an openURL service such as SFX to create links out from the list to external services such as catalogues. For instance, if a list links to a book that is accessible through the local OPAC, the student must link from Telstar to the local openURL service which then resolves to a local catalogue. Thirdly, rather than using the bookmarklet approach of List8D (where, for instance, Amazon is searched for a bibliographic reference and added to a list via drop and drag), all list material must be imported through a RefWorks file or added as part of a manual process. While this does

standardise the import process within the application, it does assume the regular use of RefWorks by anyone adding lists data such as academic staff or librarians. Telstar's user interface does not rely on hierarchical lists like List8 but rather employs a more integrated environment; additional functionality like tagging or comments is not allowed. However, the additional steps involved in locating material via the openURL service potentially complicate the discovery process for students.

Talis Aspire is a commercially available system that relies upon semantic web technology. For the purposes of this evaluation, Talis provide an account that was used to access a free, web-accessible version of the system called talisaspire.com. Talis Aspire does claim to integrate with a variety of VLEs (rather than just Moodle, as in the case of Telstar and List8D). Additionally, the system may be used with a variety of LMSs and integrates not only with the OPAC, but also acquisitions systems; where List8D is able to send orders to vendors like Blackwell, Aspire relies upon the local acquisitions module to complete any transactions. Aspire relies upon a bookmarklet-type system where material can be dragged and dropped form a variety of sources (Amazon, OPAC, etc.) directly into a list. List material may also be shared between institutions via the web-accessible version - lecturers may search for material appearing in the lists of other institutions and import any items. However, like the two open source systems, there is no provision to import lists from textually-based formats such as Microsoft Word. Additionally, while records for individual list items utilise a contemporary interface that lists and links to related material, offers direct links to catalogues or electronic versions for articles, at the course list level, the system uses a hierarchical format similar to that employed by List8D. The potential strengths of Aspire over the open source system lie primarily in its ability to fully exploit data. Not only is similar material recommended, but the system is able to compare usage statistics across institutional lists and show material that might have been used in similar reading lists in different institutions. Likewise, this functionality lends itself to MIS reporting; institutions may view how many times material has been used in lists, how many times students have clicked through to resources, and thus serves as a stock management tool. Students and lecturers may fully annotate and tag material.

Specifications

Based on the literature review and suggested best practices within institutions and the evaluations of List8D, Telstar and Talis Aspire, the following list of specifications is suggested for any potential implementations of reading list systems within an Irish academic context. These specifications are noted in three broad areas: systems integration, data importation and user interface.

The area of systems integration addresses a number of issues identified through the professional literature review and some of the issues considered in the software evaluation. With regard to systems integration, reading list systems should:

- Expose core services through a standard set of APIs or web services for integration with the most popularly used Virtual Learning Environments. While some open source

reading list system projects have focused on integration with specific VLE platforms, such as Moodle, in order to ensure pervasive adoption and use, at both an intra and inter-institutional level. Current use of VLE systems within both Ireland and the UK suggests a heterogeneous adoption; while universities may rely on a primary vendor, often more than a single system is used on a department by department basis for delivery of resources to students. A system truly integrated with a wide range of VLEs through common APIs also creates the possibility of sharing reading list data across institutions.

- The reading list system should be integrated with multiple modules of the Library Management System. In practical terms this would that that not only would resources be discoverable through the catalogue (e.g., catalogue items added to resource lists) but that the reading list system would be integrated with acquisition workflows to obtain potential items for lists. Also, list usage data ought to be integrated with circulation modules to assist in the collection of management information data.

- Lastly, the available APIs or web services should allow for extensible integration with other university systems such as financial and registry services. This would ensure that the reading list discovery service would sit within the larger context of all university systems.

Besides addressing how the service relates to other university services, systems integration potentially resolves some of the cultural issues and issues of usage by communities identified in the professional literature review.

Cultural issues in particular are also potentially alleviated by how data importation is handled by the reading list system. The reading list system should:

- Allow for direct importation of lecturer-generated reading lists in a standardised fashion. This might be possible through a number of mechanisms. For instance, lists are often produced in word processing software formats, such as Microsoft. Accordingly, templates for lists could be identified at an institutional level and then used to automate the list ingest process. The ability to import from other systems should be investigated as well. For example, if lists are generated for module descriptors within registry systems, there should be some provision to re-use the registry data.

- The reading list system should enact a principle of "create once, re-use many times". Not only should data ingest processes by standardised and automated, but it should be possible to both import and export list data to and from a variety of sources. Lecturers might export data from a VLE into the reading list system, while students should be able to extract list data for use with a variety of reference management software.
- The overall disposition of the system with regard to data should clearly favour automated processes over manual. As a last resort, staff may manually key lists, but there should always be other mechanisms to facilitate data import. Likewise, the system should

favour discoverability in a variety of settings. This means that academic staff could add items from Amazon or other vendors via the use of bookmarklets (like in List8D and Talis Aspire) or import Google Scholar search results.

Lastly, how systems are used by different academic communities and how the systems might reflect pedagogical models are addressed, in part, by the user interface design.

- Reading list system data should always be contextualised in terms of the student accessing the system. For instance, students accessing the system in a stand-alone view of the application (rather than via a VLE) should only see modules for which they are registered. Long, hierarchical lists through which students are forced to scroll in order to find applicable listings should not be exposed to students. While such a format may be appropriate to academic staff or library staff using the system as a stock management tool, such views might not always be the most appropriate for students.

- It should be possible to fully annotate and add commentary to lists. Lecturers should be able to create annotations at an individual student level as well as a module level. Students should be able to annotate and share lists with other students. This would allow academic staff to tailor course content to specific students when necessary.

- The reading list system should promote, rather than overtake, the resource discovery process. While the system may provide direct links to library material and electronic and web resources it should promote research skills and processes as well.

Recommendations

A number of recommendations can be made based on the current status of reading list systems in the Irish University context. As has been observed, with the end of support for Talis List in June 2011, there are currently no reading list systems deployed in Ireland. Additionally, the VLE landscape is quite varied in implementation with Blackboard acting as the primary system and a number of other deployments, most notably Moodle, constituting the remainder. The reading list landscape in the UK is clearly dominated at the moment by Talis Aspire. Though a number of open source implementations do exist, Loughsborough's LORLS is the strongest open source option. However, one of the outcomes of this study is the suggestion that open source reading list software is not at a such level of institutional adaptability nor sufficient maturity to warrant deployment in the university context. The failure of List8D to provide a viable solution within its developing institution is indicative of the current situation as a whole. The Head of Academic Liaison in Kent remarked "it proved not to be suitable for use by our academic colleagues and we did not have the resource to develop further." The level of expertise necessary to adapt the open source systems currently on offer to local library and university environments might seem beyond the current financial means of most institutions.

Recommendation 1 - Needs Assessment Project

The initial recommendation would be to conduct a large-scale needs assessment project related to teaching and learning systems within Irish University libraries. This would establish the scale of services and functionality necessary to provide services related to resource lists. The specifications above, based as they are on a review of the professional literature and current best practices, should serve as a guide for defining the services.

Recommendation 2 - Shared System

As a possible outcome of the needs assessment, the development or adoption of appropriate reading list services and systems should be evaluated on a national scale. Such an evaluation might follow on the recent work of the IUA Librarians Group Task and Finish Group on Shared IT Systems. A significant level of cost savings, similarity in reading list content and commonality of vision among institutions might justify such a shared approach.

Recommendation 3 - Shared Services

Given the prohibitive costs involved in developing a system for national implementation, the IUA Librarians should initiate a discussion with a vendor such as Talis to investigate the feasibility of a shared service. The advantage of deploying a semantically-based system like Talis Aspire on a national basis means that Irish University data is potentially shared among institutions. Such a large-scale data set could mean the development of additional services such as recommendation or MIS data contributing towards a national stock management service.

Recommendation 4 - Business Process Audit

Any institution considering a reading list system, should conduct a thorough business process audit pending the outcome of the needs assessment. This business process audit should focus on the workflows surrounding the creation of reading list material. The audit should focus on any processes outside, as well as inside, the library. The purpose of such an audit is to identify areas of duplicated tasks (e.g., creation of lists by academics, library staff, as part of registry systems, etc.) with the overall aim of rationalising those workflows pertaining to reading list creation. This recommendation aims to address two issues identified in the professional literature: inter-organisational relationships and the creation of reading lists.

Recommendation 5 - Data Templates

Based on the outcome of the business process audit, institutions should seek to establish a set of common templates for reading lists with the eventual aim of using these templates as the basis for automated list uploads to a reading list system. Reliance on manual process to input lists and the effect of such processes on institutional perceptions has been noted above. This issue should be treated as primary to successful implementation of wide-spread use of any reading list system.

Appendix 1

Reading List Systems in UK HEIs (adapted from http://helibtech.com/HE+Systems+Review)

Institution (From HERO listing of HEIs)	Reading List System	VLE
Edinburgh Napier University	Aleph	WebCT
York, University of	In-house (EARL)	Blackboard
Kent, University of	List8D	Moodle
St Mary's University College, Twickenham	LMS	Moodle
Trinity Laban Conservatoire of Music and Dance(Jerwood Library of the Performing Arts)	LMS	Moodle (trial)
Durham University	LMS Course Reserves	Blackboard
Bangor University	LMS Course reserves, VLE	Blackboard
Loughborough University	LORLS	
Salford, University of	LORLS	
Leeds, University of	Own solution - integrated with Blackboard	Blackboard
Oxford, University of	Reading List Direct	
London School of Economics and Political Science	Reading List Manager - LSE's in house system	Moodle
Bolton, University of	Talis Aspire	
Brunel University	Talis Aspire	Blackboard
Derby, University of	Talis Aspire	Blackboard
Harper Adams University College	Talis Aspire	Moodle
Keele University	Talis Aspire	Blackboard

Lancaster University	Talis Aspire	In-house (LUVLE)
Manchester, University of	Talis Aspire	Blackboard
Plymouth, University of	Talis Aspire	SharePoint
Portsmouth, University of	Talis Aspire	Blackboard
Robert Gordon University	Talis Aspire	
Sussex, University of	Talis Aspire	Moodle
Bournemouth University	Talis List	
Brighton, University of	Talis List	Blackboard
Central Lancashire, University of	Talis List	
Cumbria, University of	Talis List	
Glamorgan, University of	Talis List	Blackboard
Greenwich, University of	Talis List	
Oxford Brookes University	Talis List	
Queen's University Belfast	Talis List	
Sheffield Hallam University	Talis List	Blackboard
Sheffield, University of	Talis List	
Ulster, University of	Talis List	
Wolverhampton, University of	Talis List	
Manchester Metropolitan University	Tals List	
Aston University	VLE, LMS	Blackboard

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