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Briefing paper

Library management system to library services platform. Resource management for libraries: a new perspective

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This is the first Higher Education Library Technology briefing paper. HELibTech [1] is a free and open community resource which aims to provide a starting point for anyone interested library technology in Higher Education. This paper was supported by sponsorship from ExLibris Group,[2] a provider of library automation solutions. The author is a consultant who takes an independent and impartial view of the issues.

[1] http://helibtech.com/
[2] http://www.exlibrisgroup.com/
[3] https://creativecommons.org/publicdomain/zero/1.0/

"You have no idea how eager I am to ensure that the notion of library does not disappear – it's too important. But the thing is, it's going to have to curate an extremely broad range of materials, and increasingly digital content." Vint Cerf (Vice President and Chief Internet Evangelist for Google)[1]

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LIBRARY SYSTEMS - A MARKET SHIFT

In 2007 a major library management system (LMS) study was commissioned jointly by Jisc (a major UK HE sector body that: "champion[s] the use of digital technologies in UK education and research")[2] and SCONUL (Society of College, National and University Librarians). The report was published in 2008 [3] and the advice was clear: "Now is not the time for new LMS procurements." The report painted a picture of a mature market dominated by four vendors with products that were not strongly differentiated. This perspective was supported by Margaret Coutts, former University Librarian at Leeds who remarked: "The field of library management systems (LMS), once a continually changing landscape....had to a large extent stabilized."[4] In broad terms university libraries followed the study's advice. Rather than buying a new LMS, spending was instead focussed on technologies such as discovery services, reading list systems, institutional repositories (IRs) and RFID based self-service systems. As a consequence if you ask a librarian what library management system they use, they will often reply by naming a system that has the functionality and workflows that would be familiar to a librarian working twenty or thirty years ago. The user interface may be graphical or even web-based but the underlying 'DNA' of the system will often reveal an ancient (in technology terms at least) heritage. This situation is not unique to libraries of course. 'Legacy' systems are to be found in many sectors and their persistence has a number of sound reasons.[5]

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STASIS TO TIPPING POINT

The statis in terms of the LMS was not peculiar to the UK and nor was concern about development. In 2012 librarians from Princeton University Libraries and the College of New Jersey Library expressed their frustration in the following way: "The library automation system, also called the integrated library system (ILS), has not changed much for the past two decades. It finds itself uneasily handling the ever-changing library environment and workflow. Library staff becomes ever more frustrated with the ILS, noting its inadequacy in dealing with their daily jobs."They went on to conclude: "It is obvious that we are at the tipping point for a dramatic change in the area of library automation systems."[6] Also analysing the situation in 2012, consultant Carl Grant commented: "The amount of change we've seen, both in computer technology and in library management/operations, is so substantial that the best way to accommodate the change is to start with a fresh design that can take advantage of all of these changes."[7]

A key shift since 2007 has been a clear recognition that the MARC format, which has been at the heart of library systems for half a century, is no longer fit for purpose. In 2011, the Library of Congress launched its Bibliographic Framework (BIBFRAME) Initiative,[8] a project to re-imagine and reinvent the bibliographic environment for description and discovery. The ultimate objective is to replace the current MARC-based ecosystem. Any new ecosystem will surely have to embrace linked data which is now gaining much more attention from librarians. The linked and open data in libraries (LODLAM) community held its first summit in 2011. In 2012 Google launched its Knowledge Graph, a massive knowledgebase that has made linked data mainstream. Library system vendors know they must respond to this new focus on metadata and the semantic web. But the answer won't be enhancements to legacy cataloguing modules. Local cataloguing, at least for mainstream content, has all but disappeared from UK university libraries.

THE RISE OF THE LIBRARY SERVICES PLATFORM (LSP)

At around the same time as the above-mentioned reports and reviews, the market for new resource management systems started to pick up in the UK. At this point the first of a new generation of systems, exemplified by Ex Libris' Alma, became credible. The University of Sheffield's invitation to tender in 2011[9] was a watershed and stated: "The library places the utmost importance on the architecture for any new system being modern, fit for purpose & designed specifically to operate within a cloud environment." The library acknowledged that the market for such systems was at an early stage and it wanted to: "Work in concert with a vendor and other interested research library stakeholders to contribute towards the design, development and delivery of a next generation library system which will produce a unified resource management approach to the full spectrum of library collections."

"With the increasing dominance of electronic content and digital collections in academic libraries, the capabilities lacking in the current slate of automation systems has increasingly become an obstacle to progress"

THE CHANGING NATURE OF THE LIBRARY COLLECTION

"THE FULL SPECTRUM OF LIBRARY COLLECTIONS"

A key pressure point for change has been the inability of legacy systems to provide effective management for what the University of Sheffield called the "full spectrum of library collections." This is a failing also stressed in 2011 by consultant Marshall Breeding, who wrote: "With the increasing dominance of electronic content and digital collections in academic libraries, the capabilities lacking in the current slate of automation systems has increasingly

become an obstacle to progress."[10] While most academic libraries still have to manage significant print collections, much of their budget (often more than 80%) now goes on electronic resources, typically journal articles and e-books. Business models for e-resources are different from print. For example, libraries no longer have to own content outright in order to provide access for their users. From around 2011/2012 the adoption of e-books in UK universities has accelerated [11] and business models such as demand (or patron) driven acquisition have become popular. However, conventional library systems have found it hard to deal with these innovations. Some library system vendors did create and some libraries did implement electronic resource management (ERM) systems but many libraries, especially in the UK, saw them as too complex and offering insufficient return on investment. They preferred to use Microsoft Excel instead.

Around the same time universities, especially research focussed ones, were implementing quite separate systems to manage the collection, preservation and dissemination of digital copies of their intellectual output. Almost no UK university is now without its own institutional repository (IR), which may hold a diverse range of materials including journal articles, theses, dissertations, reports and presentations. There are other kinds of 'library' systems too. Archives will have their own system to handle their distinct archive management workflows and approach to metadata. The archive system in turn may be linked to separate repositories containing digital images of important archive or special collection material. Many universities are more fully acknowledging the value for teaching and research of these "unique and distinctive collections" [12] (UDCs) that potentially cover "collections in all formats and at all locations."[13]

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Course and learning materials are curated in a virtual learning environment (VLE) which is typically not managed by the library. In turn the VLE or learning management system may be linked to a separate reading list solution which typically *is* managed by the library. Furthermore, libraries are getting involved earlier in the scholarly communications process in terms of managing research outputs prior to final publication. UK libraries are increasingly taking on the role of managing research data[14] and some Library Directors are leading initiatives in (Open Access) publishing.[15]

All these systems tend to have their own specialised staff, workflows, metadata formats and supporting technical infrastructure. What we see (or more importantly, what the user sees) is a bewildering array of systems and interfaces that have grown up at different times to meet different needs. However, what they broadly have in common in terms of resource

management is that the materials are owned, licensed or produced by the institution. They are *institutional* collections.

BEYOND THE INSTITUTION

'Library' and 'collection' have been intimately linked for hundreds of years. 'Collection development' is typically seen as a core library activity. Stanley Wilder, Dean of Libraries at Louisiana State University, asserts: "Libraries do two things: they build collections and they provide pedagogies for collection use."[16] In the past users and library collections were in close proximity and it could be hard for users to access other collections. Libraries were judged by the material they contained and, in the case of the Association of Research Libraries (ARL), ranked by the number of volumes housed. However, in the 21st century collections are increasingly dispersed shared resources. For example, The Scottish Higher Education Digital Library (SHEDL)[17] is a consortial purchasing scheme providing the eighteen Scottish Higher Education Institutions with access to over 3,460 online journals and 39,000 e-books from leading academic publishers. The UK's Jisc-led national monograph strategy roadmap of 2014 articulates a vision: "that - within five years - UK researchers and students will have unparalleled access to a distributed national research collection enabled by an open collaborative national infrastructure."[18] These developments mean that it is now much harder to define what a library collection is and therefore how to manage or develop it.

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From a user's perspective, Google has fundamentally changed the way in which academic resources are approached. Users are no longer limited by a local collection managed by librarians. Writing in Wired magazine Tom Vanderbilt notes: "In just a few years we have gone from search engines - the name now sounds as archaic as the Victorian 'difference engines' - with their roots in the staid academic discipline of information retrieval, to, simply, 'search'."[19] What is searched by Google seems boundless and certainly Google's ambitions are far from modest: "One of the things we're trying to do is first to catalogue everything in the world you might want to know about."[20]

OPEN AND FREE RESOURCES

Many of the resources found through Google are not managed in any sense by libraries and are freely available. In contrast, library-centric discovery services, initially at least, tended to exclude this material and instead focused on owned or subscribed resources. Stanley Wilder states that: "The collection function is essentially a quality filter for the content that drives teaching and research."[21] Librarians were cautious about the quality of open access resources:

"Librarians will still need to vet open access indexes, books sources, and individual journals for scholarly quality before including them alongside toll products on the library website and in the catalog."[22]

The growth of quality open access has eroded that position. The new 2015 vision statement for the British Library notes: "The idea of openness, in multiple ways, is having a profound effect on the landscape of information services and cultural provision. Open Access to research publications has developed faster and more extensively than many envisaged, with growing volumes of publicly funded research made available openly on the web."[23] However, managing open access material remains problematic for libraries. Lorcan Dempsey, Vice President, OCLC Research and Chief Strategist acknowledges that: "Libraries lack streamlined tools and processes to manage open access materials as part of their collections. There is no reliable way of identifying open-access material, there is no consistent practice about identifying use and reuse and there are no comprehensive aggregations."[24]

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WHAT SHOULD LIBRARIES DO?

Library resource management now encompasses a much greater diversity of material, physical and virtual locations, and business models than a generation ago when many of the installed library systems were designed. Indeed, it is probably more realistic to think in terms of an ecosystem rather than a monolithic library system.[25] Given this evolved context, what should libraries do seven years on from the Jisc/SCONUL LMS study?

MORE EFFICIENT AND EFFECTIVE SYSTEMS INFRASTRUCTURE

In 2012, Christian Reilly, Manager of Global Systems Engineering at Bechtel, commented on the rise of cloud computing: "We will see the beginning of the dawn of infrastructure irrelevance."[26] With all the competing demands on university libraries it becomes harder and harder to justify effort being devoted to managing tasks such as software upgrades and system back-ups. Indeed hosted systems are commonplace. Libraries are now taking the next steps towards what the University of Sheffield called in its invitation to tender: "A born cloud based system." This is essentially a single system with the multiplicity of client libraries being 'tenants.' These 'clouds' may be regional (e.g. European) in order to meet legislative requirements but, within each multi-tenant environment, there is only one copy of the application software, one operating system and one database supporting multiple

organizations on a single bank of servers. The vendor only has to deploy, develop, maintain and upgrade one copy of the software. In contrast a hosted solution is much less efficient. While the hardware infrastructure may be shared the vendor still has to support a multiplicity of client systems that need to be maintained separately. The efficiency benefits to the vendor of what is in effect one single global (or at least multi-national) library system are clear. The benefits to the library of a multi-tenant approach are less clear and immediate but may, in the longer term, be wide ranging. The pace of software development should increase and we may well return to that "continually changing [library system] landscape" described by Margaret Coutts. The notion of a *platform* is fundamental to this new generation of systems. Speed of development is enabled because the platform does much of the basic work and leaves developers free to concentrate on the business logic for whatever application they want to create. In this context developers might also be third party companies or even universities or libraries. Furthermore if we think of these library 'tenants' as working within a growing 'shared service' there are significant benefits.

> "We will see the beginning of the dawn of infrastructure irrelevance"

SHARED SERVICES

Libraries have a long track record in sharing bibliographic data. Regional, national and international shared catalogues have a long heritage that predates the cloud. OCLC has re-engineered WorldCat into a cloud-based library data platform that forms a key component of its own Worldshare Management Services (WMS) library system. Libraries using ExLibris's Alma can participate in a shared 'Community Zone' of bibliographic data. The 2008 Jisc LMS study suggested that SCONUL and JISC could stimulate shared services development and that that there was potential to go beyond catalogue data. As a result SCONUL created its Shared and Collaborative Services Strategy Group [27] that has worked with its member institutions and Jisc to develop services. By 2013 this joint work had matured into a national shared system project for Wales[28] and the UK-wide *KB+* knowledge base [29] to support the management of electronic resources[30]. Data sharing is evolving beyond bibliographic data. For example Jisc and SCONUL are partners in a two year project: "Our aim is to provide a set of basic learning analytics tools drawing from a range of data sources and using proven metrics."[31] Here we enter the world of business intelligence, big data and analytics.

ANALYTICS

The analysis of big data leading to actionable insights is broadly known as 'analytics' and is now a major part of corporate business intelligence. Jisc acknowledges that for Higher Education: "Activity data can enable an institution or a service to understand and support users more effectively and to manage resources more efficiently."[32] This approach is a step change from the familiar concept of 'management information'. If library systems are brought together under the umbrella of cloud-based shared systems, regionally and nationally, the pot of data for analysis is larger and potentially more useful. There is opportunity to make substantial improvements in resource management using data collected automatically and analysed by a single cloud based system shared by multiple institutions. It is significant that ProQuest released the analytics module for its Intota library service platform ahead of print management capabilities.[33] Once library 'big data' is shared with data from other institutional systems a world of powerful learning analytics opens up with libraries playing a major role.[34]

"Activity data can enable an institution or a service to understand and support users more effectively and to manage resources more efficiently"

WORKFLOWS

Library system infrastructures tended to develop piecemeal over many years in response to particular demands. As discussed above, this commonly results in distinct operational silos with their own systems, staff and workflows. New demands such as improved management of the research process and research data tend to spawn yet more silos. While the unification of all systems may remain a pipe dream, reducing the silos is not. Libraries are looking for more coherent and efficient workflows for managing print, electronic and digital resources and this is hard to achieve with a legacy system. Metadata is acknowledged as important but there are still problems in harmonising data across separate print, electronic, repository and archive silos.

CONCLUSION: FROM LIBRARY MANAGEMENT SYSTEM TO LIBRARY SERVICES PLATFORM

MEETING STRATEGIC AND INSTITUTIONAL GOALS

What does the new generation of resource management systems need to achieve? In my work[35] with senior academic librarians the same strategic concerns come up again and again:

- How can learning and research outcomes be improved?
- How can library resources be better aligned to the teaching, learning and research needs of the institution?

- How can the user experience of library services be improved for library staff, academics and students?

There is increasing pressure on libraries to clearly demonstrate their value in supporting wider institutional goals. For example the current University of Sussex library strategic plan[36] lists critical issues as: "Ensuring that our services align with the strategic priorities of the University." The library mission statement highlights the provision of services: "particularly those relating to learning, teaching and the student experience, research..."

EXTENDING INTEGRATION AND INTEROPERABILITY

Most librarians now view the integrated management of print and electronic resources as a core requirement and are beginning to look for further integration. Reading list capability, up to now managed by add-on systems such as Talis Aspire and Rebus:list, is becoming fully integrated.[37] Library services platforms are also expanding to other kinds of repository and we might see them replacing institutional repositories instead of just harvesting the data for discovery services. The platform approach, built on technologies such as web services-based service oriented architecture (SOA) also offers the opportunity for cheaper, easier and better interoperability with external systems including institutional administrative systems such as student systems and finance.[38]

THE CLOUD IS THE NEW NORMAL

In 2008 it was right to be cautious about LMS procurement. However, in 2015 the market has moved on, marked by the change in terminology to library services platform (LSP). There is less concern about the cloud technology underpinning these systems. Indeed, at the end of 2014 Amazon Cloud Strategy Chief Andy Jassy declared: "You can have different opinions about how complete and how fast this transition is going to happen, but it also seems apparent at this point that the cloud is becoming the new normal."[39] In 2000 most of the institutions within the University of Wales selected the same (Voyager) library management solution but implemented it as separate institutional systems. In 2015 *all* the institutions together with the National Library and National Health Service (NHS) libraries adopted a single shared services model based on the Alma LSP.[40]

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THE LIBRARY SERVICES PLATFORM COMES OF AGE

Most library system vendors are moving to cloud based library services platforms although their routes to that end may differ.[41] "Library services platforms can no longer be considered 'next generation systems,' but rather by now well established products that have seen implementation in hundreds of libraries."[42] Librarians are certainly taking a much more positive approach to implementing new library systems than they were in 2007. An analysis of the list of systems on Higher Education Library Technology (HELibTech) reveals that around 15% of UK Higher education Institutions have already decided to move to a library services platform.[43] It is still early days but it is already clear LSPs will now move at an accelerated pace to integrate more resource management silos into a shared cloud based ecosystem. They have to if they are going to meet the strategic demands of librarians and their institutions.

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