The Big BUT: the influence of business, users, and technology on unified resource discovery

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Abstract
The University of Auckland Library has introduced a Unified Resource Discovery (URD) environment, but has discovered implementing the technology alone does not necessarily provide a complete solution. This paper identifies other constraints, including different business models and user behaviour for acceptance of new technology that can influence the outcome. It concludes by articulating the role the Library can play in facilitating alignment between business, users, and technology to achieve a URD environment that works.

Approaches to Resource Discovery

In 2006, The University of Auckland Library began monitoring technology trends in resource discovery and reviewing software development of next generation library catalogues to replace the public search interface of its Integrated Library System (ILS).

Specifically the Library's requirement was a one- stop application that could provide a unified library research environment, broader in scope than its existing catalogue's functionality, by creating a discovery layer for searching print and digital resources and returning integrated results from multiple different data sources. The application's interface was expected to be more user-intuitive, in line with expectations created by internet search engines, and would also utilise social web features, enabling user engagement and interaction.

After investigating available product options and visiting international development sites in 2007, the Library selected the Primo application from Ex Libris as its preferred solution. Implementation began in 2008 with a beta version being made available in the second semester, during which time end-user feedback was canvassed to refine the initial release. Having survived design by committee, the production version of *The Catalogue* was launched in Semester One, 2009.

Figure 1: *The Catalogue* simple search

Figure 1 shows *The Catalogue* offering a single search box for keyword searching, with no filters for pre-search limiting. This represents a significant departure from the Library's previous Voyager catalogue, which offered nine different searching options for Library users to choose from. Reaction to *The Catalogue* has generally been very positive: since its introduction between 60 -70% of responses to an ongoing user survey consistently rate it as good or excellent. Additional comments received as feedback are indicative of the level of satisfaction expressed by different user communities.

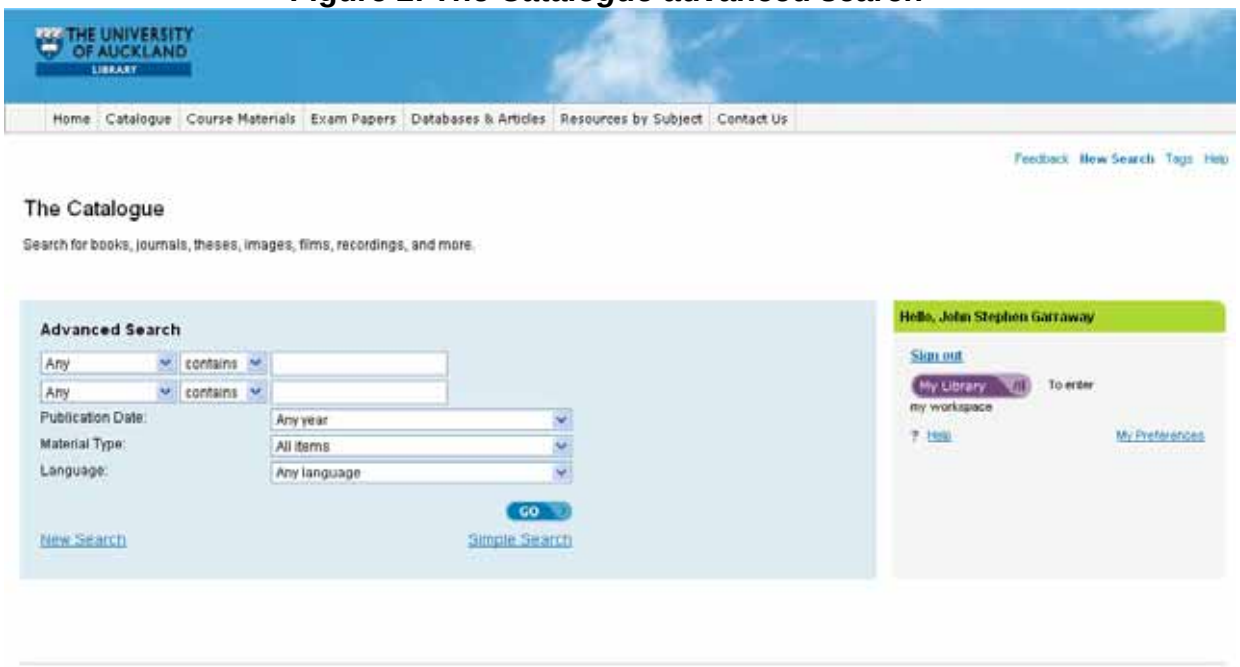
> "This is an excellent resource and brings the search activity into one central place." (Academic staff member)

> "It's more user friendly than Voyager and requires less clicks to get to material." (Post-graduate student)
>
> "Catalogue search was easy to use and consistently gave the results I wanted." (Undergraduate student)

However, these comments also highlighted differences between end-users' expectations of search functionality versus the Library staff's own requirements and assumptions about their clients' needs. As users, librarians have (with some exceptions) found the transition more professionally challenging, and are adjusting to a new resource discovery environment that does not require nested Boolean searches, allow for call number browsing, or retrieve more relevant results when definite articles are included in the search string! Ultimately, this dilemma is about different users' needs. In this context it is about balancing the requirements of experienced advocates for 'precision search limiting' with the expectations of novice library users whose formative discovery experiences have been chartered by exploration of a "GoogAmazonian" world.

The Library's response has been to set up a library staff advisory group, with representation from public, learning, digital, lending and cataloguing services. The role of this group is to review ongoing feedback to *The Catalogue* and make recommendations for changes, based on a set of principles that emphasise simplifying and enhancing access to, and delivery of, library resources for end users. In terms of the searching dilemma outlined above, this has resulted in a compromise: the simplicity of the single search box approach for basic searching is maintained, but an advanced search option, configured with many boxes, allows users to premeditate their search in similar ways to the traditional catalogue, as shown in Figure 2.

Figure 2: *The Catalogue* advanced search



The initial release of *The Catalogue* has enabled users to search across an extended range of library resources simultaneously. So far data from four different local sources is exported to Primo and then re-indexed, integrating records from the print inventory, digital asset management system, and database modules for digitised exam papers and course materials. This new pre-index functionality provides three significant benefits for the user:

(a) Saving time by not having to search different databases independently.

(b) Search-engine like speed for the retrieval of results (as compared with federated search options that may take some time dependent on the number of targets being individually interrogated).

(c) Result sets that emphasise the quality and quantity of library resources available for teaching, learning, and research (compared with potentially dubious content and relevancy ranking encountered when using the Internet).

BUT…

Despite these benefits, The University of Auckland Library does not yet have the unified research environment it set out to achieve, as all resources cannot be comprehensively discovered via the one search interface. Unified Resource Discovery (URD) is currently compromised by:

(a) Local data sources requiring development time to enable an export to Primo.

(b) Negative user reaction to response time of federated searching for remote data sources resulting in this functionality being switched off as part of *The Catalogue.*

(c) Aggregated content in commercial databases that cannot be connected for federated searching or is not available for pre-indexing.

The net result is the user benefits outlined above are less than expected, as there is still more than one place to search, there is a discrepancy between speed of local versus remote database searches, and selective rather than comprehensive result sets are produced. Consequently, the Library has an ongoing work programme to enable export functionality for other local data sources (or migration of content to an already configured data source), while continuing to explore emerging technologies and assess product developments' potential to achieve the desired functionality required for its URD environment, especially in relation to eternally hosted data sources.

On the surface these issues appear to be about available technology and performance, and there are a number of vendor solutions now available, built on the premise of pre-indexed search capability which promise to deliver a resolution. However while The University of Auckland Library is intrigued by these developments, it is also pondering the question: *Is there more to implementing a successful URD environment than how the technology works?*

Simply the answer is yes, as there are at least two other critical factors to consider. Again, put simply, these are how business works and how users work. To have a URD environment that works you need to have business, users, and technology aligned. Otherwise, you are up against the big BUT.

The big BUT is really three questions:

(a) Will the *Business* model allow what you want to do?

(b) Will the *Users* behave as you expect them to?

(c) Will the *Technology* perform as it has promised to?

Critical to answering the above questions is to understand the impact change has on business, users, technology, and the interdependencies between them, which I shall discuss specifically in the following order:

1. The speed of technology development
2. The challenge to norms in business practice and models
3. The mass user acceptance of change effected.

Technology

Beginning with technology, how has the speed of change impacted on technology developments and adoption by library services? To illustrate this, I shall review user approaches to resource discovery during my professional career, starting in 1990 in a National Library service division, where the card catalogue was still the primary user interface to the library's collections. In 1992, this service division automated and had its first OPAC. In 1995 I was working in a public library when a public internet access service was introduced, followed four years later in 1999 by its first website including remote access to its catalogue. From 2000-2004, electronic resources were first networked across the public library system, and then delivered through the website as a digital library available remotely to authenticated members. In 2005, I moved into the tertiary sector where federated searching attempted to compete with internet search engines' capability for searching and retrieving across multiple data sources. Finally, in 2008, I was responsible for leading the project implementation of a next-generation library catalogue.

This narrative, with some variation between early adopters and late starters, probably sounds very familiar to most library and information practitioners of the last 20 years. Librarians as individuals are often early champions of the potential in new technology for end users. Paradoxically, libraries as institutions are usually not in the same position because of financial or other resource constraints. Arguably, this limits the library's responsiveness to the impact of new technologies or software and their adoption, suggesting a role of impotent bystanders more than trail blazing innovators.

Alternatively, this could be viewed as an opportunity for libraries: providing time to evaluate performance in early adopters' production settings, assess strategically the user benefits (including acceptance) and institutional risks, and to identify the human and infrastructure resource required for implementation. The biggest risk is choosing

the right moment to invest in order to maximise the return. Ideally, this would be at a time when affordability is synchronistic with the tipping point of new technology's mass socialisation, which would demonstrate awareness of user behaviour and enable a service model that keeps in line with user expectations. At the worst, adoption is being part of a long tail with its own risks of buying into last generation technologies out of step with the next generation of users.

However, this narrative's purpose is to suggest that the cycle of technological change impacting on libraries is perpetual, occurring at least every 2-4 years. Most practically, an organisational culture of change readiness, which accepts that services and technologies change rapidly, means developing a level of comfort with an environment in perpetual beta. Very observant technology watchers will assess when an emerging technology has reached a maturity that cuts the "bleed" from leading edge and allows for less painful development when adopting.

During 2009, The University of Auckland Library has monitored specific technology trends and vendor developments that potentially may influence any rethink to its existing approach to IT infrastructure. These developments include 'cloud' computing models, software as services built around them, and delivery via mobile devices or social software. Of ultimate concern are how these technologies perform, who uses them, and what their impact will be on the Library's approach to URD.

Business

The role of vendors in technology development leads to my next discussion point about business practice and models. In Becta's annual round-up of emerging technologies and key trends relevant to education, cloud computing, including software as a service (SaaS), is described as IT hosted by a third party and delivered as a service over the internet allowing organisations to buy services when and as they require them without procuring and maintaining their own infrastructure: (Becta, 2009).

Product examples of SaaS utilising cloud computing which are relevant to libraries and URD are OCLC's WorldCat Local, Serials Solutions' Summon and Ex Libris' recently announced Primo Central. Although there are other players emerging in this field, these examples reflect The University of Auckland Library's ongoing monitoring and review of URD development by these vendors. The underlying premise of all products is a unified resource discovery service enabled through one simple search and returning quality results in a single relevancy ranked list. What is different between these products is the extent to which a SaaS approach is demonstrated by the level of hosted functionality enabled through cloud computing.

OCLC first announced plans for piloting WorldCat Local in April 2007. This service allows web-scale discovery of local resources utilising metadata contributed to WorldCat.org integrated with locally maintained services such as circulation. Since then the WorldCat Local service has been enhanced to include article citations provided by a range of e-publishers and content aggregator partners. More recently, OCLC and EBSCO have signed an agreement that allows subscribers to both services to have easy access for end users to full-text content: (OCLC, 2009).

Serial Solutions launched the Summon service in January 2009. A fully hosted solution, this total URD service, which includes harvested local data sources, offers an efficient search of all types of resources through one box, returning results at search engine like speed; functionality facilitated by leveraging the company's prior relationship with more than 6,000 publishers to provide article level metadata for e-resources: (Serials Solutions, 2009).

Plans for Primo Central were announced by Ex Libris in July 2009. This centrally hosted index aims to complement its existing Primo search application by offering a service that allows searching of re-indexed data harvested from members of their publishing programme simultaneously with local data sources or as a discrete set. Ex Libris are beta testing Primo Central with fourteen institutional partners from January 2010: (Ex Libris, 2009).

From a technology perspective, any of these products would potentially appear to provide options for resolving the issues currently compromising The University of Auckland Library's URD environment. Pivotal to this is the pre-indexing of authoritative, scholarly electronic content provided by publishers and aggregators. Technically this addresses the speed of retrieval differential between searching local indexes and meta-searching of remote licensed resources, and would enable comprehensive discovery functionality to be restored to *The Catalogue*. Through a business lens, more pre-indexed content surfaced quickly through *The Catalogue* will produce better results sets, increasing user satisfaction by saving them time as well.

However, the business lens also detects a rosiness glossing over the defects of this picture. The success of these services depends on the technology developers' ability to engage with the academic publishing and database aggregation business communities, and negotiate deals that allow metadata of their content to be pre-indexed. Without this metadata, especially those of the major academic journals, the commercial viability of such services would be in doubt.

All of the above players have recognised this and, as their product summaries demonstrate, each has begun to carve its own niche in this competitive market. Yet this very competitiveness potentially compromises the effectiveness of the business model and may limit customer choice. Undoubtedly exclusive licensing arrangements for pre-indexing metadata of scholarly content gives any of the SaaS providers a market advantage to leverage over the other competitors, but it also may disadvantage library customers if no one SaaS provider has all the pre-indexed metadata it requires to enable a true URD environment.

This fundamental flaw undermines the promised success of URD as it locks resources and discovery together in one service for delivery in a complex business relationship that compromises end user access. Arguably, this is little different to what happens now in electronic publishing and the bidding for exclusive rights to content, which results in prised content shifting between different database platforms. However, it seems the stakes are much higher than when deciding to renew subscriptions or not with an aggregator or publishing service if they can no longer supply the content. This is because the investment that libraries have in their

resource discovery environments is fundamental to the service they deliver and how users access the resources they have.

The critical lesson here is that no library wants to be in the position of compromising discovery access as a prerequisite for rights to exclusive pre-indexed content; or to invest in technical functionality that works, if there is no substance in pre-indexed content to support it. As it is highly unlikely that any one SaaS provider will end up with 100% exclusivity (creating a monopoly with no competition) for pre-indexing purposes, it would be preferable that URD technologies could be evaluated independently of any conditions that require exclusive access to pre-indexed content to be considered as part of the equation. Alternatively, collaboration may be required between competing SaaS providers to enable solutions that allow for pre-indexed resources implemented partially with another company's discovery software that fits with a library's preferred URD environment.

Ultimately, this depends on which way the pendulum will swing at the publisher and aggregator level. An open business model, which promotes non-exclusive licensing of content metadata for pre-indexing purposes to SaaS providers, could be as profitable for publishers and aggregators as exclusive partnerships. This is new business for them and could also increase library customers for their content, if it could be pre-indexed and discovered as part of URD, because this would simplify and speed discovery for end users. Certainly libraries would benefit more from such an approach, but it will be interesting to review in due course if publishing metadata becomes the bargaining chip, influencing whether a competitive business model will prevail or a more collaborative approach will evolve.

Users

Users and their online behaviour may play an influential role in determining the business model's outcome, which leads to my final discussion point about mass user acceptance. Web 2.0 has mainstreamed a social paradigm, where creation, participation, and sharing are the guiding principles in the digital space, informing a new consumerism in the parallel physical world that is reshaping the way in which products and services are being configured for mass acceptance and utility. More mobility, through functionality, performance, and affordability, is giving rise to a "fingertips generation" connected 24x7, moving seamlessly between their virtual and physical lives.

This fingertips generation can be characterised by their confidence and capability in using technology as part of everyday living more than as a specific demographic age group. New technologies will be judged successful if they are capable of quick adoption across most age groups because they enhance functionality of ubiquitously socialised ICT devices or networks, even though there may be a requirement to "buy up" in order to update or upgrade.

This constant capability for connectivity and capacity for consumption has implications for understanding user behaviour regarding their preferred approaches to resource discovery. From the library perspective, this requires rethinking the URD environment beyond its own interface, particularly about how this translates or is

customised for display on an expanding variety of mobile devices and plethora of social networking sites.

A mobile technology example illustrating the user-centric approach required is Boopsie, a company specialising in mobile search. Their service utilises predictive text searching of pre-indexed metadata and Global Positioning System (GPS) location mapping when a mobile phone is used for searching a library catalogue. This demonstrates recognition of the user's connectivity mode and physical context, by reducing the amount of texting required to expediently return a result, and efficiently mapping the closest library location to the user's current position, based on pre-programmed libraries frequently visited. WorldCat Mobile is using Boopsie.

Delivery to mobile devices is part of The University of Auckland Library's plan for extending the reach of its URD environment. This also includes giving increased focus to investigating other tools that enable users' URD access without always having to visit the Library's website. Initial work in this area has included the development of a *Library Search* widget, which combines three search options for finding books and articles. Users can "get the code" to copy and paste the widget's HTML code into a website or blog of their choice. Alternatively, buttons have been preconfigured for embedding with Google, Facebook, and NetVibes (www.netvibes.com). Figure 3 shows the *Library Search* widget embedded in an iGoogle page.

Figure 3: The *Library Search* Widget

However, providing services designed to suit perceived user preferences does not always mean users behave as predicted. Although *The Catalogue* has introduced Web 2.0 read/write features, such as tagging, to enable more user interaction and participation, so far there is little evidence this is being utilised widely by users other than library staff testing the functionality, or cohesively in a teaching, learning, or research context. A review of the most popular tags to date shows the most popular is a combination of "course name and paper number", such as history324, yet this is only attached to nine records. This approach to identifying course related materials appears to be the preferred folksonomy for tagging. Other examples include due dates (used for items urgently required) and various citation styles tagging items to be referenced in that style.

This provides an interesting insight into user behaviour. Inclusion of social web features does not necessarily immediately translate into library engagement. There is possibly a more fundamental shift required by libraries to change the fingertip generation's preconceptions about discovering library resources online, replacing teaching the complexity of the ILS with more emphasis on intuitive discovery and critical skills for evaluation of results found. Certainly, the positive user feedback to the introduction of *The Catalogue* endorses this shift. Nevertheless, as has already been discussed there are different, sometimes conflicting, user needs that require the URD approach to be flexible enough to enable optimisation for any user profile.

Reducing the BUT size

Ultimately, there is no definitive answer to the questions of the big BUT: technology will perpetually evolve, businesses must be profitable to survive, and users will always be unpredictable, because this is human nature. However it is possible for any library to mitigate some of the BUT's effects by conveying, managing, and creating expectations for a URD that works.

Beginning with users, it is critical to define profiles for key client groups and the information tasks important to them that characterise their relationship with the Library. These expectations must be conveyed to all library staff charged with different aspects of service design and delivery, and an agreed approach to URD developed which recognises the length and depth of these relationships in their context for teaching, learning, and research in an academic setting.

Technology changes rapidly and can introduce new functionality that significantly alters service design and delivery. Any major upgrades of technology functionality involving significant change for users should be assessed both in terms of time required for technical implementation planning and alteration to user services delivery. Sometimes more functionality will be at the expense of embedded processes that can overshadow the success of the new features' implementation. It is important to manage expectations of users (staff and clients) by under promising the benefits, over delivering the results, and being clear about what compromises are involved as there will never be a URD solution that pleases everyone.

Equally, there is never a perfect time to introduce new technology. Perpetual beta means iterative change and constantly adding functionality that should benefit users and aid discovery without significant disruption. The fingertips generation is more

adept at accepting this iterative approach and their expectations may be better managed this way. There will always be a long tail of some size, but these users' needs are profiled and can be managed through this change by targeted information literacy courses.

Finally, libraries can create expectations for vendors, returning to them the onus for developing services and technologies that allows the library as customer to provide a URD environment tailored to their community's profile. As consumers of products and services, and advocates for their users, libraries can lobby for open and collaborative business models which would ensure URD is a reality in practice and not just a product sales pitch.

How might this be achieved? Well, presenting a conference paper on this topic called the big BUT sounds like a good place to start…

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