The Tipping Point: How Granular Statistics Can Make a Big Difference in Understanding and Demonstrating Value

Abstract

Purpose

The purpose of this paper is to introduce an original, quantitative approach to examining the use of library electronic resources by demographic (or 'market segment'). In turn it provides an innovative way to demonstrate and explore the value of libraries and importantly, electronic collections.

Methodology

The University of Wollongong's Performance Indicator Unit (PIU), in partnership with the University of Wollongong Library (UWL), has built a data warehouse - the 'Marketing Cube' that links real time usage of electronic resources (eresources) at a title level, to student demographic data.

Findings

The Marketing Cube design provides a robust analytics framework for examining pictures of use of eresources by student demographic. For views explored, the cube reveals rich data for demographical context against number of student logins and engagement with resources in hours. Findings give rise to further questions or hypotheses, requiring further interrogation of the cube or triangulation with other available quantitative data or qualitative inquiry with faculty.

Practical Implications

An ongoing commitment to continuous improvement at a university and library executive level is critical. UWL is fortunate to have secured the support of the enterprise Performance Indicator Unit (PIU), for this second UWL performance measurement project. The Marketing Cube also exploits tested system design created for UWL's 'Value Cube' (Jantti & Cox, 2012). Considerable time has been invested anew to select priority resources and to configure them within the cube. Significant time was also spent on user acceptance testing by both the Library and PIU.

Originality / Value

Existing research and literature has more often achieved to demonstrate the value of library collections on a qualitative basis. In contrast, the Marketing Cube offers a quantitative perspective and is focussed solely on student use of resources - the library's broadest client base. Real time use capture and weekly reporting provides UWL with a granular picture of who is using a resource and when; on demand. This contextual insight has strategic value to acquisition and renewal decisions; but most innovatively, such analytics data can inform marketing strategy and provide a method to pre and post-test impact of promotional activity.

Introduction and Background

In 2009, the University of Wollongong Library (UWL) first sought to establish ways to quantitatively assert how it added value by asking *what is the value to the student when they use library resources?* This question was posed after years' of regular use of survey and feedback systems to qualitatively determine and evaluate client needs, satisfaction and perceptions. Whilst survey and questionnaires are established methods to gauge library service performance, qualitative techniques provide little, if any insight into impact on the client – an endeavour common to all library sectors when seeking to demonstrate value to administrators. In the Higher Education context, an important primary success factor is student academic performance outcomes, thus the library posed the bold hypothesis *that students who use Library information resources get better grades*. Consequently, before the development of the Marketing Cube described in this paper, its precursor, the [UWL] Value Cube was designed and examined.

UWL partnered with its in-house Performance Indicators Unit (PIU) to design a world first evidence based tool - a multidimensional database, fittingly badged the [UWL] 'Value Cube'. The Value Cube, which has *sessional* reporting capabilities from ongoing harvesting of students' borrowing of books and *total* use of online resources, links with student demographic and academic performance information. The methodology and findings are appraised in one of 2012's 10 most widely read *Educause Review* articles (Cox & Jantti, 2012a); and reported more extensively in a 2012 research article (Cox & Jantti, 2012).

Findings from the Cube did show evidence of a strong positive correlation between students' grades and use of library resources, providing the sought after evidence of impact, enabled through the cube's design capability. A key element is the use of the Student ID number, providing the necessary connector to client demographical context such as faculty, gender and age, and also course level and course stage. The onward scope and impetus for all stakeholders to want to investigate potential relationships at a demographic level was and still is extensive. Hence the Value Cube created a system design legacy that could go on to support a second phase of research, seeking to answer such questions as *who is using what, and when?*; *can we or faculty encourage the non and low users to engage with resources?,* and more ambitiously *can we test if we have been successful in influencing their behaviour by looking at post intervention use data?* The latter addressing yet another major challenge faced by libraries, which thus far has also relied on the traditional method of survey (Shen, 2014).

To answer such questions it has been necessary to build a separate cube – the Marketing Cube, which replicates the demographical elements of the first cube, but includes use data for individual

online resources on a *weekly* basis to provide a real time view of resource use. Where the Value Cube enables UWL to describe impact on educational outcomes as the measure of value; the Marketing Cube enables UWL to not only describe, but also experiment with affect, where actual resource use provides a different measure of value.

Problem Statement
"if Content is King, Context is Queen" (Furbank, 2014; various)

Libraries invest approximately 30% of their overall annual budget in the collection and increasingly, at least 25% of that is in online resources (Jubb et al, 2013), namely large databases containing ejournal collections, but also video content and premium single journal titles. It is increasingly paramount then that libraries are able to evaluate return on investment (ROI) in these collections by examining to what extent they are used. De-identified vendor supplied use data goes some way to illustrate overall use of content by the entire university population (staff and students).

The importance of usage data is also illuminated by the evidence from the Value Cube that suggests engagement with library resources (presumably relevant resources) impacts positively on student success, which in turn contributes to the demonstration of library value. The main objective of effective collection development then is to ensure collections remain relevant to information needs in a changing educational and technological environment, so that they are used. The challenge is attaining knowledge and understanding of the context of resource use in relation to information need.

The Value Cube research asserted too that "in its role as intermediary and facilitator in connecting authors to readers; there are four main points at which UWL can add value: *discovery, access, engagement and collection development*" (Cox & Jantti 2012). This would be true of most libraries and if they could gain contextual insight into who was using what and when; it could help support the four points of value by informing the activities which set out to address them, including direct client service, marketing, information skills training and acquisition of resources.

Assuming discovery is an instigator of access - as well as system based discovery, the other single most activity that can support discovery is marketing. Cox & Jantti (2012) have already stressed that "without [marketing intelligence], libraries cannot identify, in an accurate manner, whom to target for promotions, or whether promotions have increased the market share of information consumers". Currently, at best de-identified vendor supplied usage data can inform which resources are underutilised overall, but fall short of demonstrating underutilisation by the target group for which the resource is intended (by the vendor, library and/or academic). For example, assessing what might

be considered as reasonable use of *Environment Complete (EBSCO)* by Environment Science undergraduates. In turn, there is currently no method of testing whether marketing efforts have been successful. Again only monthly vendor use data can identify increased use, but the time lag after intervention risks more likely influencing factors. Immediate data with which to measure and evaluate marketing efforts is often lacking, but if garnered offers the potential to provide a feedback loop for continuous improvement and could help libraries explore which marketing techniques and tactics are most effective. What is described here is essentially an emerging need for 'consumer' or customer analytics, a utility yet to be fully explored by libraries, but already exploited in retail (more on that below).

Literature Review

Seeking to quantitatively assert how the library adds value is not a new pursuit. Tenopir and King (2003, 2006, 2010a, 2010b, 2011, 2012, 2013) have dominated the research landscape for over thirty years with regard to measuring and reporting on the impact and value of library resource use, but most consistently from a qualitative perspective and with focus on researcher perceived value as linked with research output. These authors have achieved considerable leverage from their survey approach. Originated in 1977, it has evolved and withstood the shift from print to online information access. Qualitative analysis offers an insightful methodology for revealing a picture of use at a point in time. As demographical data capture is a typical aspect of survey completion, findings could point to differences in demographical factors, such as that between age and discipline. With its relative ease to replicate and scalability, such research has given rise to similar surveys across multiple institutions and continents (Tenopir & Volentine, 2012; Tenopir 2010), all of which have illustrated differing demographical contexts of information seeking and use behaviours.

Understandably, in a climate of public funding cuts, most of the recent studies have focussed on analysing library resource use and, Jubb et al. (2013) would argue; its "indirect" impact on organisational goals, such as student retention (Haddow, 2013), research outcomes (Jubb et al, 2013) and student academic performance (Cox & Jantti, 2013). However each of these and previous studies touch on use itself as a measure of value in its various guises, such as time spent on accessing eresources (Tenopir et al, 2010), and the unit cost per use calculation that is useful for comparing variation in value between different institutions or over time (Jubb et al, 2013).
In terms of the methods used to capture use; as well as examining vendor supplied data (COUNTER reports), various studies have already established the method of data mining raw usage logs, whether that be their own (Nicholas et al 2010; Cox & Jantti 2012; Haddow, 2013) or a publishers (Jubb et al, 2013). Tenopir and colleagues even turned their interest to capture of logs with the increasing emergence of ecollections (Nicholas et al, 2006). Whereas Jubb et al's research focused on the publisher logs for just *ScienceDirect* and *Oxford Journals*; Haddow's study (2013)

echoes to some extent the work conducted in a similar period by Cox & Jantti (2013). Haddow also examines a time series (at least one year) of all authenticated logins from the library management system (rather than ezproxy), for all eresources. This use data is then linked to the university's student enrolment system using the unique Identifier - the student ID number. Haddow also found a positive correlation between the number of logins and student retention. With student demography available as part of the ID data, mature age students were found to withdraw at a greater rate than younger students. Haddow notes the utility of this insight in informing the "development of library services to target specific student groups".

Having found a correlation between library use and impact at a case study level, few studies at this stage have made a clear step from having designed a replicable method for measuring value, to actually leveraging their findings for a future utility such as a continuous improvement tool, as Haddow infers. This is unsurprising given the resource intensity of sourcing and analysing such data (Cox & Jantti, 2012, 2013), and as Jubb et al point out "there are notorious difficulties in assessing changes in value over time". However, Jubb et al also offer a point of difference in that having conducted their initial study, they pursue a secondary aim to model three strongly correlated variables - expenditure, usage and research outcomes. This is an attempt to quantify how good the variables are as predictors of each other which helps further underpin their measurement method. This subsequent work takes their initial findings beyond demonstration of correlation, to a proposed cause and effect - that "expenditure drives use" according to their UK study.

The most closely related study to that presented here is of course the earlier research at UWL. At the time of the UWL's study linking library use to student success, the original concept of a Cube on which to frame marketing activity was also borne. What was meant by marketing at the time centred on the information skills training classes delivered by Learning & Research Services Librarians which along with other objectives, aim to raise student awareness of relevant starting points for information discovery, including promoting discipline specific resources. As described earlier in this paper, measuring the impact or reach of these resource intensive tutorials was limited to satisfaction surveys. It was thought a second cube could be designed based on the first that would quantitatively measure the impact on resource use, pre and post such marketing. There were at least three limitations in the original cube design to realise this capability: contextual use data was not available frequently enough, having been aggregated for a semester view. Use data was for the collective use of eresources, not individually identified datasets; and the technical infrastructure of the cube system did not have capacity to store and retrieve such deeply identified use data at that stage. The methodology herein is a description of the design and development of the UWL Marketing Cube, which has addressed these earlier limitations.

A brief note on marketing in libraries

The role of marketing information resources is an interesting and critical one. Commercial and non-profit industries stand to benefit from marketing, with its role simply defined as:

> the methodology of communicating the value of a product or service to customers, for the purpose of selling that product or service.

(Wikipedia, 2014)

While the more obvious fit is in the commercial context for increased sales and profit, the current focus on demonstrating value in libraries, illustrates its importance in the non-profit environment too, where client need is still sought to be met for mutual gain. Cox & Jantti (2012) submit that "sound marketing can improve a library's value proposition". 'Sound' might include identifying 'target markets' – "a group of customers towards which a business has decided to aim its marketing efforts" (Kurtz, D, 2010 on Wikipedia), but it should also include monitoring and measuring impact of marketing efforts in the same way that retailers would seek to identify whether their promotional activity had met its objectives in terms of sales, increased consumption or gains in market reach or share. Patil and Pradhan (2014) explore the role of marketing in libraries and recommend that libraries need "to know users need … and purpose", and conclude "it will be worthwhile to formulate different strategies for individual segments".

A brief note on an emerging branch of analytics

With commercial contexts again in mind, retailers and service providers, particularly those operating online are now able to identify user behaviours and preferences via e-commerce and social media. Proprietary analytics tools such as *Google Analytics* combine customer data with behaviour to offer a picture of use that can inform future target marketing. Similar analytics are proving useful in a Higher Education context, with University of Wollongong already referenced as leveraging analytics that have exposed students' contributions, or lack of, to discussion lists in order to identify less engaged students and those at risk. Clearly higher education is adopting analytics practices to better identify and understand its client base in an emerging and growing area of 'learning analytics' (Educause, 2010; van Barneveld et al. 2012).

Methodology

The Marketing Cube is an Oracle based data warehouse with an intuitive IBM Cognos user interface at the front-end. It has been developed by the University of Wollongong's Performance Indicator Unit (PIU), in partnership with UWL. It combines usage of UWL eresources with student demographic data housed in other enterprise systems, linked and driven by the unique identifier - the student identification (ID) number.

A student's ID number is also captured as part of the online authentication process for using eresources. UWL subscribes to OCLC's Ezproxy system to manage authentication, therefore, it is the immediate ezproxy log that feeds the Marketing Cube's programming in terms of usage. The ezproxy log by design captures all the related URL strings generated by a single search session in a particular eresource. This might include URLs related to site adware, Chat services and other extraneous data. As a result, counting the number of entries in the log against a student ID does not constitute number of uses; therefore it is necessary to aggregate at this stage in terms of determining what constitutes use of a resource. The same business rule is used as in the Value Cube. That is:

- The day is divided into 144 10-minute sessions.
- If a student has an entry in the log during a 10-minute period, then one sixth is added to the sum of that student's access for that session.
- Any further log entries during that 10-minute period for that student are not counted.

While the above manages the count of sessions, the nature of the aggregation also means that the Marketing Cube may 'snapshot' a student's use at either the entry point or when they have moved 'deeper' into the resource and beyond the landing page URL. In order to collate all relevant URLs and assign them at the granular level of a single named electronic resource, a unique proprietary URL identifier was determined that would be true for all 'destinations' within the database. This was provided for 193 electronic resources; chosen for their invested value and likely discovery via Library web pages at a native interface level. For example where the Database name is: *ASME Digital Journals,* and the configured landing page URL (before ezproxy) is: *http://asmedigitalcollection.asme.org* The proprietary URL identifier (regardless of a clients place in database) is: *asmedigitalcollection*

It is these 193 resources on which the Marketing Cube can report, as well on a remaining 'Not Defined' 'bucket' of resources which are considered 'noise' - the extraneous data described above. An attractive and responsive feature is that the cube's design is sufficiently flexible in that upon acquisition of new electronic resources, new proprietary URL identifiers can be added, making it a sustainable tool for ongoing data collection. On the interface side, the functionality is similar to that of Excel pivot tables, researchers can drag and drop the dimensions of the cube such as date, faculty and campus into a cross-tab table. All reports can be exported to Excel for further examination. Three measures were created to have unique scope with the named electronic resources. This was necessary as legacy measures from the Value Cube can only demonstrate total eresource use aggregated by semester, and cannot identify the individual resources used or on a weekly basis. The Marketing Cube's distinct named eresource use measures are:

- *Number of Students (Electronic Resources Uses – ERU)*
  This is the unique count of number of students regardless of how many different courses they enrol in – however, only students who have used eresources and have an entry in the ezproxy log during a nominated period will be included in this measure.
- *Sum of Named Electronic Resources Usage (Hours)*
  Counts in hours the total time students use specific Library Database Names while within session. Within session means the Named Electronic Resource Usage is able to be associated confidently with a specific University session - a grace period rule applies to the log capture timeframe.
- *Sum of Unallocated Named Electronic Resource Usage (Hours)*
  Counts in hours the total time students use specific named library databases while out of session.

Importantly, non-users (people) are not profiled in the Marketing Cube, but non-use is, so the capability is centred on identifying used and underutilised resources by demographic and time series, rather than students who are non users of resources as was available as an aggregated view in the Value Cube.

It was decided to only include the past three year's data 2012-2014. Primarily because this range best supported the updating mechanism within the system. The data load for a weekly data warehouse on the hardware and software infrastructure is huge. The larger the data source the slower the initial set up and updating process. Delay would certainly diminish the cube's offering of a real time weekly view. Secondly, the past three years use data from vendors has typically been evaluated to inform renewal decisions, as it provides a sufficient time series on which to determine a picture of use or trend.

With the Marketing Cube's release, the next design challenge was, what priority questions should be asked and framed within the cube. User acceptance testing (UAT) was a good place to start examining broad and general views of the variables, such as use of all configured eresources as used by all campuses and all faculties for the past 3 years. This identified whether the proprietary URLs were accurate (no listing of the resource indicated something amiss with the URL identifier), and allowed the project team to judge whether the top 50 high use resources were those the library might also expect; 'testing' the integrity of the data.

Based on the earlier findings of the Value Cube and the problem statement herein; initial intrigue lay in use by particular disciplines of the specialist resources that are intended for them. This includes

whether traction is gained over the weeks and how the use of publisher specific eresources compares with that of aggregator databases. Justifiably from an ROI perspective, curiosity also exists around use of databases that are indexed or not in the discovery layer. Initial questions posed included:

- *Are Bachelor of Nursing students using specialist health resources in their first year of study, as compared with aggregator databases?*
- *At what point do Engineering undergraduates engage with library databases?*
- *Do those databases indexed in the UWL discovery layer, constitute the most highly used databases in the past three years?*

Early Findings & Discussion: The [Mesmerising] Power of Context

The Marketing Cube's intuitive design and relative ease to drag, drop and display a multitude of variables (or 'dimensions') is somewhat overwhelming. It presents UWL with a 'tsunami' of data - delivering on completion, an overnight famine to feast of usage data and potential institutional insight. What is striking about the resulting database is the ability to retrieve contextual data at varying hierarchies of granularity, never before available. For example, course demographics are available at the faculty level or can be drilled down to the degree or award type. Notable too, is the flexibility to not only view weekly data as intended, but also by year, session, month *and* day (although updates are sufficiently limited to weekly), as part of the generic structure of the calendar year date dimension. Actual sessional weeks are deliberately not identified, to enable flexible selection of relevant session dates, to account for slight changes to dates year to year. These levels are also available to map against more than one measure of use - login counts or hours spent using, within and out of session.

Questions such as those in the methodology were an important first step in structuring and navigating the Cube data. While less focused on granular contexts, the broad UAT query described in the methodology (use across all datasets by all campuses, all faculties, 2012-2014), hints towards Jubb et al's finding that expenditure drives use, or certainly comprehensiveness of the resource. For both *number of students (ERU*) and *sum of named database use (hours),* the top 10 resources are aggregator databases including, Elsevier's *ScienceDirect, RMIT's Informit databases, ProQuest Central* and *EBSCO Megafile,* with an almost inconceivable combined total of 926,466.241 hours use. Despite one of the aims of the cube being a focus on identifying underutilised resources, it is a positive discovery to see such high use of these premium resources. Such findings also initiate reflection on how these databases are indexed in the discovery system or currently promoted across campuses.

Question 1 within the methodology – *Are Bachelor of Nursing students using specialist health resources in their first year of study, as compared with aggregator databases?* was posed based on the cube's original intent with regard to whether the library has some effect in its promotion of discipline specific resources to target cohorts. The Nursing undergraduate course receives information skills training early within Session 1 (March-June), which points students to both aggregated discovery and specialist resources such as the *Cumulative Index of Nursing and Allied Health Literature (CINAHL)*. Medicine and Health related resources also tend to be relatively premium in cost compared to other discipline resources, hence an ROI interest.

To explore the value of the weekly view (Sun - Sat) for this context, a cross-tab table was prepared for measure *sum of named database use (hours)* for eight specialist health databases and one single journal title (*Medical Journal of Australia*), as well as two aggregators, for Bachelor of Nursing students at all on-shore locations. The nominated time period was 2014, Session 1, broken down into its constituent weeks. The nominated context of the *Bachelor of Nursing* cohort and the *First Year of Study* was added as a filter, which does not display in the view, but provides overarching context for the report.

On generating data for this view, an extensive table is produced displaying data for each site and resource as well as the month's total for all on shore sites. The size and granularity of the data tables for a weekly view of just weeks 1-5 of a 13 week session is somewhat challenging in terms of being able to export or chart data. However a picture of use is certainly offered and the potential insight is massive. For the purposes of this paper, the data within this first report has been condensed to just weeks 1 and 2 and for the aggregated total for all on shore (Table 1.). Even then, significant new insight is gained, which demonstrates both the breadth and depth of data available and for which subsequent questions are raised regarding influencing factors on growth and change in use.

Positively, there appears to be a level of engagement with relevant resources right from the start by this Nursing cohort with surprising exploration of resources in both weeks 1-2. The data shows that one aggregator database holds first position in both weeks (19.873 hours use in week 1, increasing by 178% in week 2 to 55.277 hours). While cause is not something the cube can address independently, this top result may indicate initial use of the discovery layer – which functions as the primary library catalogue. Immediately this picture of use and notable hike in use over a short period, raises more questions than answers. For example, *what or who is directing them to these resources? Why the sharp rise between weeks? Are a significant number of students completing the requisite online information skills tutorial in the first week, and as a result engaging with these resources? What role are other promotions playing?* For example online guides that recommended

databases organised by discipline. *Does 'brand loyalty' (a consumer's commitment to repurchase or otherwise continue using the brand", 2014) develop or shift over time?*

Encouragingly discipline specific resource *Nursing Consult* is a close second with 17.869 and 21.042 hours use respectively. Such data fuels more questions again and a desire to understand information seeking behaviour and preferences. For example, *would it be that the database name has played a role in source selection as Nursing Consult is explicitly indicative of the content, say over more ambiguous CINAHL?* Two different platforms for *Medline* are included in the view and early preference is shown for one. While this limited view of the data is not enough to show preference over time, the cube certainly has the functionality to track preference over a time series. This initial data examination already points to a need to pair quantitative inquiry with qualitative. Availability of such data could be potentially presented to faculty, with further inquiry regarding known promotion, 'homework' or assessment drivers on the faculty side.

Sum of Named Electronic Resource Usage (Hours)	Week 1 (2/3/14 >)	Week 2 (9/3/14>)
	Teaching On Shore	Teaching On Shore
Total	54.275	114.562
Aggregator 1	19.873	55.277
Nursing Consult	17.869	21.042
Aggregator 2	7.849	13.527
Journals@Ovid	3.34	8.684
CINAHL Full text	2.505	7.014
Informa Healthcare Journals	2.004	2.672
Medline (EBSCO)	0.501	2.672
ClinicalKey	0.334	1.67
BMJ journals		1.503
Medical Journal of Australia		0.501
Medline (Ovid)		

Table 1. Sum of Named Resource Usage (Hours) by Bachelor of Nursing students in Weeks 1-2 of Session 1 in their First Year of Study.

In order to fully answer question 1., it would be necessary to structure the same reports for the months and/or weeks that cover session 2 as well as investigate use activity outside of session against the measure *Sum of Unallocated Named Electronic Resource Usage (Hours).* The measure of hourly use selected also re-framed the question towards more 'how long' are [Bachelor of Nursing] using'?. The contrasting *Number of Students (ERU)* measure would illustrate the number of unique student logins. Importantly, what's feasible is a thorough exploration of the question, as

well as comparisons between cohorts such as the Bachelor of Nursing (Conversion) – an alternative academic pathway, or the Bachelor of Nursing (Advanced) program. A marked and surprising discovery around the methodology was that much can be gleaned even at the aggregated month and year view, as the data is already providing context beyond vendor supplied de-identified monthly data.

Question 2. (*At what point do Engineering undergraduates engage with library databases?*) was posed based on Wollongong's reported strengths in Engineering as well as earlier findings in the Value Cube which identified the Engineering faculty to represent the highest proportion of non-users. A cross-tab table for Wollongong for Bachelor of Engineering students in their first year and fourteen specialist Engineering databases was examined. A second series of views was also prepared for those students enrolled in their second, third or honours year. Unfortunately pinpointing exactly *who* engages *when* within this group is limited by an aggregated dimension of 'Other Years of Study', but *when* students engage is apparent in the data. Low and sporadic use is seen in the first year, only notably of the *Institute of Electrical and Electronics Engineers'* database *IEEE Xplore (*with under 60 *unique logins* recorded*)*. Use by this cohort increases during the other years of study, but only through limited use activity in three eresources, IEEE, Australian Standards and American Society of Civil Engineers (ASCE) journals. To fully answer this question, what is considered 'engagement' in this context will need defining.

Most interesting for UWL is that despite the aggregated dimension's potential to skew the sum of hours or unique student login count; findings are consistent with those of UWL's Value Cube. What is confronting on viewing a similar picture side by side with those specialist datasets, is that use is zero to under 100 logins right through first year and into other years of enrolment. These databases represent a set of premium subscriptions that are maintained to provide relevant content for UOW's reputed Engineering strength. This is greater insight in terms of what appears to be relevant or not for Engineering students, than the Value Cube could technically achieve. It also provokes a number of considerations around return on investment and collection development strategy; that would indisputably seek to support institutional disciplinary strengths through multiple subscription and purchase commitments.

Briefly, for question 3 (*Do those databases indexed in the UWL discovery layer, constitute the most highly used databases in the past three years?*), some manual profiling of databases' discovery index status was required. For a broad view of use for all dates 2012-2014, an arbitrary figure for reasonable use was determined, and it was found that 75% of resources with under 1000 *Number of Students (ERU)* counts were those not indexed in the discovery layer. Such rich data also gives rise to yet another important avenue of investigation and the need for discussion with vendors

regarding discovery links to subscription value. Findings such as this also highlight the need to seek to understand other variables for low use and the need for strategic and targeted marketing of resources to increase use, especially before likely suspension decisions are made based on de-identified, face value data.

<u>Conclusion</u>

The Marketing Cube build has been successful in delivering a powerful lens on library collection value as demonstrated by use at a granular level; which could not previously be perceived. The sophisticated interface literally frames a picture of use of specific eresources, demographical contexts and time-series. As a result it also provides a robust analytics tool that can be used to gain insight into student search behaviours and identify underutilised resources by the intended faculty or cohort. This insight of use will in turn focus and shape future marketing strategy and create opportunity for the library to provide further value through connection of authors to readers (Cox & Jantti, 2013) via awareness raising activity. Importantly, although UWL has not yet tested the pre and post marketing intervention component of the cube's design, this is where the strength and differentiation of the real time weekly view has most potential. It appears statistically significant spikes in use can be gauged week to week, truly enabling the library to measure effectiveness of marketing efforts and methods..

The most notable challenge from early inquiry in the Cube, is that of identifying and prioritising which questions to ask or hypothesize. The Value Cube findings have further potential to inform questions, but variations between contexts provoke subset questions and the chain of inquiry appears almost limitless to satisfy a desire to understand cause and effect. The current development of other institutional cubes within the Cognos system such as a Learning Analytics cube, provides future potential for triangulation of data with Value and Learning Analytics cube data to create an even richer picture of use, value and engagement. Initial questions posed also identify a need to clarify local definitions of 'engagement' and what is accepted as reasonable use in order to establish what constitutes underutilisation of resources. This of course may vary between disciplines and the Marketing Cube offers significant potential to inform this criteria.

Reference List

Cox, B & Jantti, M 2012, 'Capturing business intelligence required for targeted marketing, demonstration of value, and driving process improvement', Library & Information Science Research, vol. 34, pp. 308-316

Furbank, S 2014, 'If Content is King, Context is Queen', *The Fresh Egg Blog: Latest Digital Marketing News*, viewed 23rd September, <http://www.fresheggdigital.com.au/blog/content-2/content-king-context-queen>

Haddow, G 2013, 'Academic Library Use and Student Retention: A Quantitative Analysis', *Library & Information Science Research,* vol. 35, pp. 27-136

Jantti, M & Cox, B 2013, 'Measuring the Value of LIbrary Resources and Student Academic Performance through Relational Datasets'*, Evidence Based Library and Information Practice*, vol. 8, no.2, pp.163-171

Jubb, M, Rowlands, I & Nicholas, D 2013, 'Value of Libraries: Relationships Between Provision, Usage, and Research Outcomes', *Evidence Based Library and Information Practice*, vol. 8, no. 2, pp. 139-152

King, D.W, Tenopir, C, Montgomery, C.H, Aerni, S. E 2003, 'Patterns of Journal Use by Faculty at Three Diverse Universities', *D-Lib Magazine*, vol. 9, no.10

Lambert, J & Conyers, A 2012, 'Adding Value to Usage Statistics: The Journal Usage Statistics Portal (JUSP) Enhancements', *The Serials Librarian*, vol. 63, no. 3-4, pp. 305-314

Shen, L 2014, Information Literacy (IL) 'Intervention Workshop has Positive, but Limited, Effects on Undergraduate Students' IL Skills: Evidence Summary', *Evidence Based Library and Information Practice*, vol. 9, no. 2, pp. 28-30

Tenopir, C., King DW., Mays R., Wu L, Baer A 2010a, 'Measuring Value and Return on Investment of Academic Libraries', *Serials*, vol. 23, no. 3, pp. 182-190

Tenopir, C, & Wilson, S, Vakkari, P, Talja, S & King, D.W 2010b, 'Cross Country Comparison of Scholarly Ereading Patterns in Australia, Finland, and the United States', *Australian Academic & Research Libraries*, vol. 41, no.1, pp. 26-41

Tenopir, C, Allard, S, Bates, B.J, Levine, K. J, King D.W, Birch, B, Mays, R & Caldwell, C 2011, 'Perceived Value of Scholarly Articles', *Learned Publishing*, vol. 24, no. 2, pp. 123-132

Tenopir, C & Volentine, R 2012, 'UK Scholarly Reading and Value of Library Resources: Summary Results of the Study Conducted Spring 2011', *JISC Collections and Center for Information and Communication Studies*, University of Tennessee

Nicholas, D, Huntington, P, Jamali, H. R, & Tenopir, C 2006, 'Finding information in (very large) digital libraries: a deep log approach to determining differences in use according to method of access'. *Journal of Academic Librarianship,* vol. 32, pp. 119-126

Nicholas D, Rowlands, I, Huntington, P 2010, 'Diversity in the e-journal use and information seeking behaviour of UK researchers', *Journal of Documentation*, vol. 66, no. 3, pp. 409 – 433

Patil, S.K. & Pradhan, P 2014 'Library Promotion Practices and Marketing of Library Services: A Role of Library Professionals', *Procedia - Social and Behavioural Sciences* vol. 133, pp. 249-254

van Barneveld, A, Kimberly E. & Campbell, A.J.P 2012, 'Analytics in Higher Education: Establishing a Common Language', *Educause Learning Initiative Paper 1*

2014 (last updated 10/11/14), Marketing: From Wikipedia, the free encyclopedia, viewed 17th November 2014, <http://en.wikipedia.org/wiki/Marketing>

2014 (last updated 30/09/14), Brand Loyalty: From Wikipedia, the free encyclopedia, viewed 27th November 2014, <http://en.wikipedia.org/wiki/Marketing>