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Successful Web Survey Methodologies for Measuring the Impact of Networked Electronic Services (MINES for Libraries[TM])

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Introduction

Web-based usage surveys are increasingly relevant in the collection of usage data to make collection development and service decisions, to document evidence of usage by certain patron populations, and to collect and analyze performance outputs. This paper discusses web based survey methodological considerations and reviews results from the MINES for Libraries[TM] web based survey at more than thirty North American universities between 2003 and 2005.

The most popular current method of measuring usage of electronic resources by libraries is not through web based usage surveys, but through vendor supplied data of library patron usage or transaction based usage. There are several standards-making groups involved with setting consistent measures of usage across publishers and products. Project COUNTER – Counting Online Usage of Networked Electronic Resources (http://www.projectcounter.org), ICOLC – International Coalition of Library Consortia (http://www.library.yale.edu/consortia), ISO – International Standards Organization – ISO 11620 Library Performance Indicators (http://www.iso.org), and NISO – National Information Standards Organization – NISO Z39.7 Library Statistics

(http://www.niso.org). Release 2 of the COUNTER *Code of Practice* for vendors to obtain COUNTER compliant certification came out in April 2005 (http://www.projectcounter.org/code_practice.html).   ICOLC issued updated guidelines of their *Guidelines for Statistical Measure of Usage of Web-Based Information Resources*, for reporting online database and journal usage in December 2001. NISO under Z39.7-2002 has developed its *Draft Standard for Trial Use: Information Services and Use Metrics and Statistics for Libraries and Information Providers Data Dictionary*. ARL *E-Metrics Project* (http://www.arl.org/stats/newmeas/emetrics) is a parallel effort to develop new measures that describe and measure networked electronic resources, based upon the *Data Collection Manual* written by Shim and others (2001).

Why is there such an emphasis on vendor-supplied data for evaluating electronic resources? Vendor supplied output data of networked electronic resources have been considered trusted because they are based on patrons' interaction with the networked electronic resource marketed or paid for by the library. The units of measure generally agreed upon across the relevant standards setting groups are based on usage of the resource in some way; either usage by session, queries, views, downloads, prints, etc. The closer the usage data is to the actual transaction or use of the resource, it seems the more reliable or fundamental it is assumed to be.

Another type of data collection of users and usage of networked electronic resources can be done through the web survey.   But there are several reasons that the web survey has usually not been as trusted as vendor supplied data to produce usage data.

1. The quantitative usage data such as prints, queries, etc., are usually a census, in which all are counted, whereas the web survey is based upon a sample.
2. A truly random sample research design is difficult to create using web surveys.
3. The samples of many web surveys are non-probability based, and therefore not open to inferential statistical statements about the populations.
4. Non-response rate for web surveys is often high, and may introduce bias. The respondents may not be representative of the population.
5. Web surveys have in the past been use to collect data about users or about sessions, but not about usage. Therefore the data they collect is not the more fundamental usage data collected by vendors of networked electronic resources.
6. The population may not be well-defined.
7. Web surveys, because they focus on users, are often collections of impressions or opinions, not more concrete actual usage, and are therefore not trusted to yield reliable data that can be compared to itself over time.
8. They are often not based on real usage, but upon predicted, intended or remembered use, introducing error.
9. Web surveys may not appear consistently when viewed in different browsers, thus affecting the results in unanticipated ways.
10. Because users have unequal access to the internet, web surveys introduce coverage error.

A useful summary of web-based survey considerations by Gunn (2002) identifies many of the issues associated with web-based surveys, while Covey (2002) and Tenopir (2003) review user and usage surveys, including some administered through the web.

MINES for Libraries[TM]

A web survey technique that attempts to address some of these problems is "Measuring the Impact of Networked Electronic Services", or MINES for Libraries[TM] (http://www.arl.org.stats.newmeas/mines.html). The primary difference between the MINES for Libraries[TM] approach and many of the other web-based user surveysis the emphasis on usage. Although user demographic information is collected, the web survey is really a usage survey not a user survey. The respondent must choose the resource in order to be presented with the survey, therefore memory or impression management errors are avoided. Users are presented with the survey as they select the desired networked electronic resource or service.   Once the survey is completed, the respondent's browser is forwarded to the desired networked electronic resource. This approach is consistent with the random moments sampling technique. Each survey period is at least two hours per month, so each survey period in itself is only a snap-shot or picture of usage.   Because the survey periods are randomly chosen over the course of a year and result in at least twenty-four hours of surveying, the total of the survey periods represents a random sample, and inferences about the population are valid.

The MINES for Libraries[TM] survey is mandatory for respondents, and based on usage or uses, not on users. One means of reducing the inconvenience to patrons of repeated surveys is to auto-populate the survey with the previous values, so that every time the survey is presented, the patron can simply click through, if none of the answers have changed. This methodology worked well for several years, passing numerous university Institutional Review Board (IRB) reviews, but patrons and faculty have become more sensitive to their options as web-based marketing has increased. In some sense, libraries are guilty by association as they follow the lead of web marketing firms and survey the patrons repeatedly. Therefore, the next iteration of MINES will record the values chosen in the initial survey of a patron's usage of electronic resources, and will invisibly (to the patron) submit those values again for subsequent use of any networked electronic resource during the sample period. Users' demographics do not change during a session, and an examination of the MINES data collected to date shows that repeat users rarely change their purpose of use.   At workstations where there is more than one patron, such as public workstations in a library, a timeout mechanism will be implemented.

MINES has followed the web survey design guidelines recommended by Dillman (2000), which suggested fourteen principles for the design of web surveys to mitigate the traditional sources of web survey error: sampling, coverage, measurement and non-response. To reduce the effects on the respondents of different renderings of the survey by different workstation browsers, the survey uses simple text for its questions. The survey is short, with only a few questions, easy to navigate, and plain. Questions are presented consistently, that is, either with radio buttons or drop downs menus. A short paragraph explains the purpose of the survey, with IRB contact information, if required.

The MINES methodology also recommends a library web architecture or a gateway in order to be certain that all respondents in the sample period are surveyed, and that web pages other than the library web site, bookmarks, short cuts, and other links all go through a central point. This library web architecture is called the infrastructure of assessment.

An Infrastructure of Assessment

The importance of a library gateway through which patron access is provided to networked electronic resources (sometimes called a click-through mechanism) has been pointed out by a number of authors (e.g., Shim and McClure, 2002; Bertot and Davis; 2004; and Antelman, 2002). Often the gateway discussion is framed in the context of log files and counters. A number of libraries have instituted click through arrangement to generate consistent counter methods for comparing database use and identifying trends and patterns. (e.g., Samson, Derry and Eggleston, 2004; Van Epps, 2001; Duy and Vaughan, 2003). The fundamental problem with gateways collecting log file or transaction log data is that the data are not very rich. It is usually proxy server protocol or HTTP/TCPIP protocol data. Vendor data is much more informative, although inconsistent.

Franklin and Plum (2002, 2004) have shown the importance of the gateway architecture or an infrastructure of assessment for web surveys, where much richer usage data can be collected by asking simple questions. The infrastructure of the gateway itself can be comprised of scripts, OpenURL servers, database-to-web architectures such as ColdFusion or php-MySQL, a referral server, a re-writing proxy server, or any other mechanism that the library can implement which assures that all requests by patrons for network services and resources go through a central gateway at which point the survey can be inserted.

An example of the infrastructure of assessment is the following diagram of a university library web architecture. Note that there are three client groups, defined by location: in the library, on campus but not in the library, and off-campus. In this diagram, the rewriting proxy server at the top, or the database-to-web solutions at the bottom of the diagram, the A-Z serials list (e.g., Serials Solutions) or possibly the OpenURL server in the upper right of the diagram could all serve as possible gateways or web survey interdiction points. The patron would request a remote database, ejournals, online catalog or other resource, and would be presented with the web survey, served by the gateway. There might also be a referrer server to which all requests that went through the proxy re-writer, the A-Z serials list, and other gateways were sent.

List of databases/ejournals
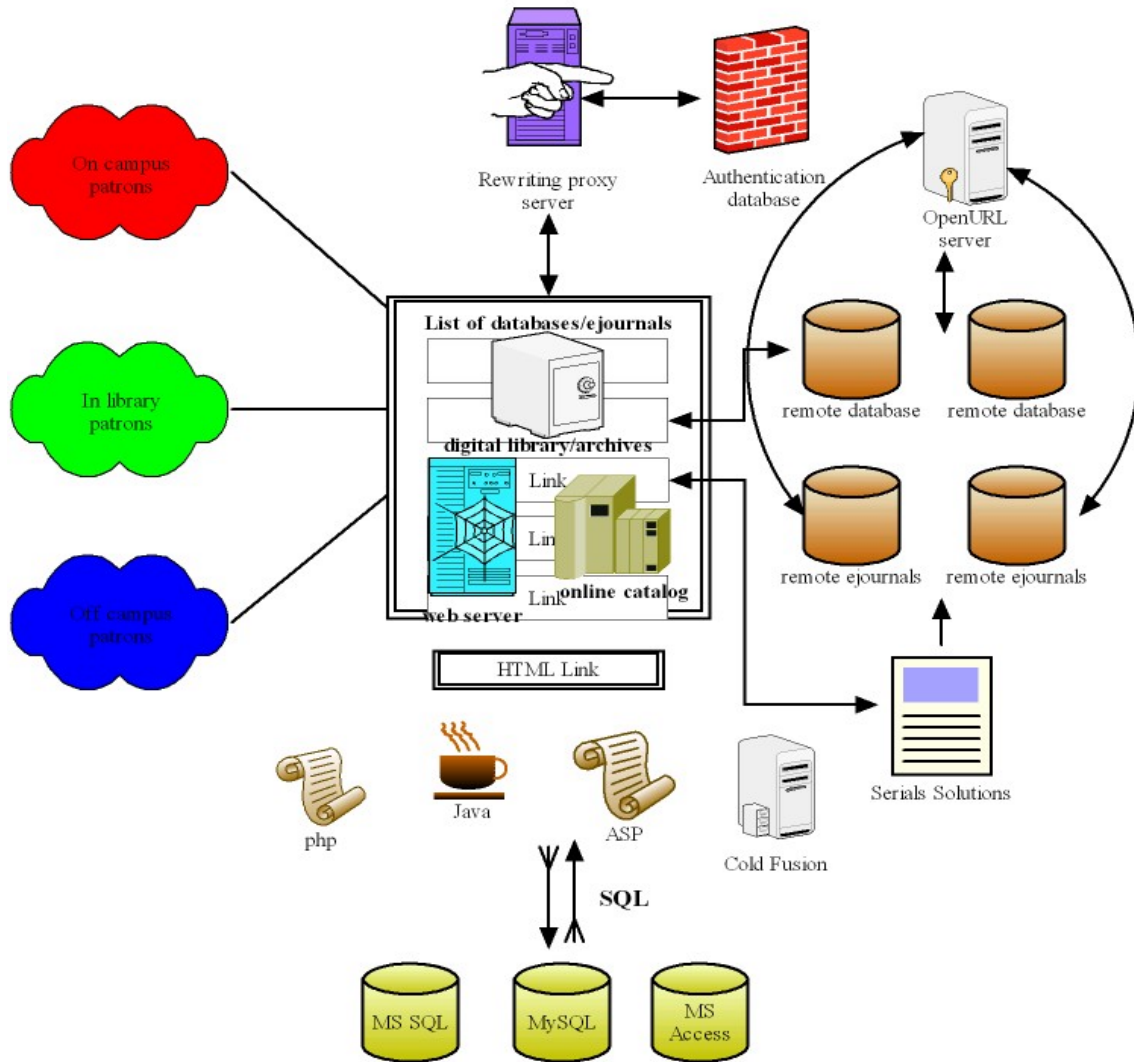
Figure 1. Example of an Infrastructure of Assessment

The imposition of a web-based survey at the gateway mitigates the effect of technological change on the vendor side. Information providers will constantly be changing their technology and their offerings. The infrastructure of assessment or middle layer assessment metrics will protect the survey from unannounced architectural or technological changes at the information provider.

In an infrastructure of assessment the library can define for itself what its networked services are, and not have to rely on vendor data. To be tied to the publishers for output data in this tumultuous period for scholarly communication is not a wise choice. Libraries are of course free to push the vendor supplied data as far as it will go, but by creating a gateway, free internet resources with some sort of value added information,

arrangement, marketing or access, could be folded into the library's suite of networked electronic resources and therefore evaluated for impact, etc. So for example, the Open URL server could incorporate Google Scholar into its list of services. It could add value to Google Scholar by customizing some of its options for its patrons. Then patrons might be tempted to go through the Open URL server instead of going directly to Google Scholar, creating usage for a library enhanced networked electronic resource.

Open Access and the Non-utility of Vendor Supplied Data

What is a networked electronic resource? Many academic and public libraries enthusiastically created subject or liaison web-based lists for their patrons, mixing and indexing free internet resources along with subscription resources paid for by the library. In academic libraries the inclusion of the free internet resources is justified because of their scholarly quality and importance to teaching or research. In public libraries, the free sources are included because of their quality and relevance to the community. Despite drawing the patron's attention to both types of resources, the library and librarians usually did not take the same level of responsibility for free internet resources. Free resources are almost regarded as found objects. It is good fortune that they exist, and even better fortune that the librarians could find them and, if not make them available, at least recommend them to their patrons.   The library might even add value to the presentation of these found objects of databases and ejournals, by providing annotations, subject terms, etc., even though the free sources may change their URL address, may die altogether, or may degrade in quality as the originators move on to other projects.

The International Standards Organization (ISO) standards for the electronic collection (ISO 2789, sec.3.2.1) includes ebooks, electronic databases, ejournals, and digital documents. ISO breaks out free internet resources to be counted separately, but focuses on the free resources cataloged in the OPAC, presumably government documents. (Bertot and Davis, 2004). The National Information Standards Organization (NISO Z39.7 , sec.4.10) defines the electronic collection as electronic databases, ejournals and digital documents. It also recommends counting separately the free internet resources in the catalog. EQUINOX excluded free internet resources by describing electronic materials as "documents held locally and documents on remote resources for which access rights have been acquired at least for a certain period of time." (Bertot and Davis, 2004).

In the definitions of networked electronic resources by the standards setting bodies, free internet resources are typically excluded or counted separately, usually because cost or expense is an important part of the metric. However, in the lists and services that academic and public libraries present to the public, free internet resources often are included. Usage of free resources may be as important to the library to measure as it was to highlight for the patron, but vendor supplied statistics will not help. Therefore, as important as ICOLC and Project COUNTER have been to encouraging vendors to supply consistent and commensurable data, the importance of these data could diminish in the coming years.

There are four other drivers, in addition to the libraries' enfolding free resources into their electronic resources mix for patrons, which argue for the growing inutility of vendor supplied data. It is paradoxical that just as the measures are becoming accepted and widely used, their limitations become more apparent, primarily because of the rapidly changing scene of scholarly communication. These other collections push the definition of scholarly resources into new directions and new environments. For the academic library, all are viable alternatives to subscription vendors, both for the library and for their patrons.

1. Digital libraries
2. Pre-print and post-print servers
3. Open access journals
4. Open access repositories such as institutional repositories

1. Digital libraries
    In the ARL E-Metrics test questions, the use of the library digital collection is a separate question from the use of networked electronic resources. Digital libraries usually represent local resources brought up by the library as part of a digitization project.   In university libraries which have elected to make available and market extensive digital libraries collections, we find that as much as 40% of the usage of the library resources is from patrons not associated with the university, almost all from off campus. (unpublished MINES data 2005) This group would not be able to use the IP limited, vendor supplied resources, but is making extensive use of local digital library resources, typically comprised of scholarly materials.   If 40% of the usage of the university libraries' networked electronic resources is taking place outside of the vendor-supplied databases, the necessity for capturing this data becomes evident.

2. Pre-print and post-print servers
    There has been a proliferation of pre-print servers or gray literature. The technology of the web has enabled a number of pre-print servers to make technical reports, working papers, business documents, and conference proceedings available to all, even those not in the knowledge flow for a particular subspecialty. In the spirit of open access to pre-peer reviewed publications, these papers are indexed, abstracted, and are available full text within such pre-print environments as arXiv.org e-Print Archive (http://www.arxiv.org), RePEc – Research Papers in Economics, (http://www.repec.org) and SSRN – Social Science Research Network, (http://www.ssrn.com/). To date the accumulation of pre-print servers does not seem to have affected the transmission of scholarly knowledge through journals, but has remained an added-value service for scholars and students, especially for those who would not have otherwise had access to the network of collegial distribution. The contents of these services and their usage are enormous.

3. Open access journals
    A second response has been proposals for open access journals. Peter Suber, in a discussion of open access definitions in the *SPARC Open Access Newsletter*, #64, defines

open access literature as online, free of charge, and free of most copyright, licensing and permissions restrictions. Open access journals have a number of possible models, most of which are described in the Open Society Institute's *Guide to Business Planning for Launching a New Open Access Journal*. The methods include author submission or publication charges, article processing fees, offprint sales, advertising, sponsorships, journal publication in off-line media, electronic marketplace, dues surcharge, grants and contributions, and partnerships. Many of these models depend upon the university or grant funding organizations, the author-pays model the most obvious example. Open access journals are not incorporated into vendor packages and do not offer similar vendor supplied data. Open access journals will strive to keep down costs, and will not be able to follow ICOCL or Project COUNTER recommendations for metrics because they do not have subscription relationships with their clients. The *Directory of Open Access Journals* (http://www.doaj.org) lists over 1500 journals available to the patrons of libraries.

4. Institutional repositories
    Lynch (2003) describes the development of institutional repositories through which libraries can assume a much more active role in scholarly communication and also leverage alliances on campus. "A university-based institutional repository is a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members." The services it offers are stewardship, organization, access and distribution. It is also committed to digital preservation, including format migration. Although Lynch takes pains to distinguish scholarly communication from scholarly publishing, and specifically makes the point that the institutional repository is not a journal and should not be managed like one, the institutional repository will change the role of the library. These institutional repositories will include both pre-prints and post-prints.

    The contents of all four of these open repositories – the digital library, pre-print discipline repositories, open access journals, and university institutional repositories – could be made harvestable by Open Access Initiative Protocol for Metadata Harvesting (OAI-PMH) and OpenURL search engines. Google Scholar (http://scholar.google.com) is just the beginning of searchable access to free scholarly content. It will become more and more effective as these repositories become richer in scholarly materials, and as OpenURL and OAI-PMH standards are increasingly adopted so that these materials can be found.

    ICOLC, in their revised Guidelines for Statistical Measures of Usage of Web-Based Information Resources (Update: December 2001) states that "The use of licensed electronic information resources will continue to expand and in some cases become the sole or dominant means of access to content." With the popularity of adding links to free materials to library web pages, digital libraries, pre-print discipline repositories, open access journals, and institutional repositories, this statement is probably outdated. Although journals titles have in fact increased, it is very likely that licensed electronic information resources will not become the sole or dominant means of access to content for libraries, but will be one means of access in a suite of scholarly offerings.
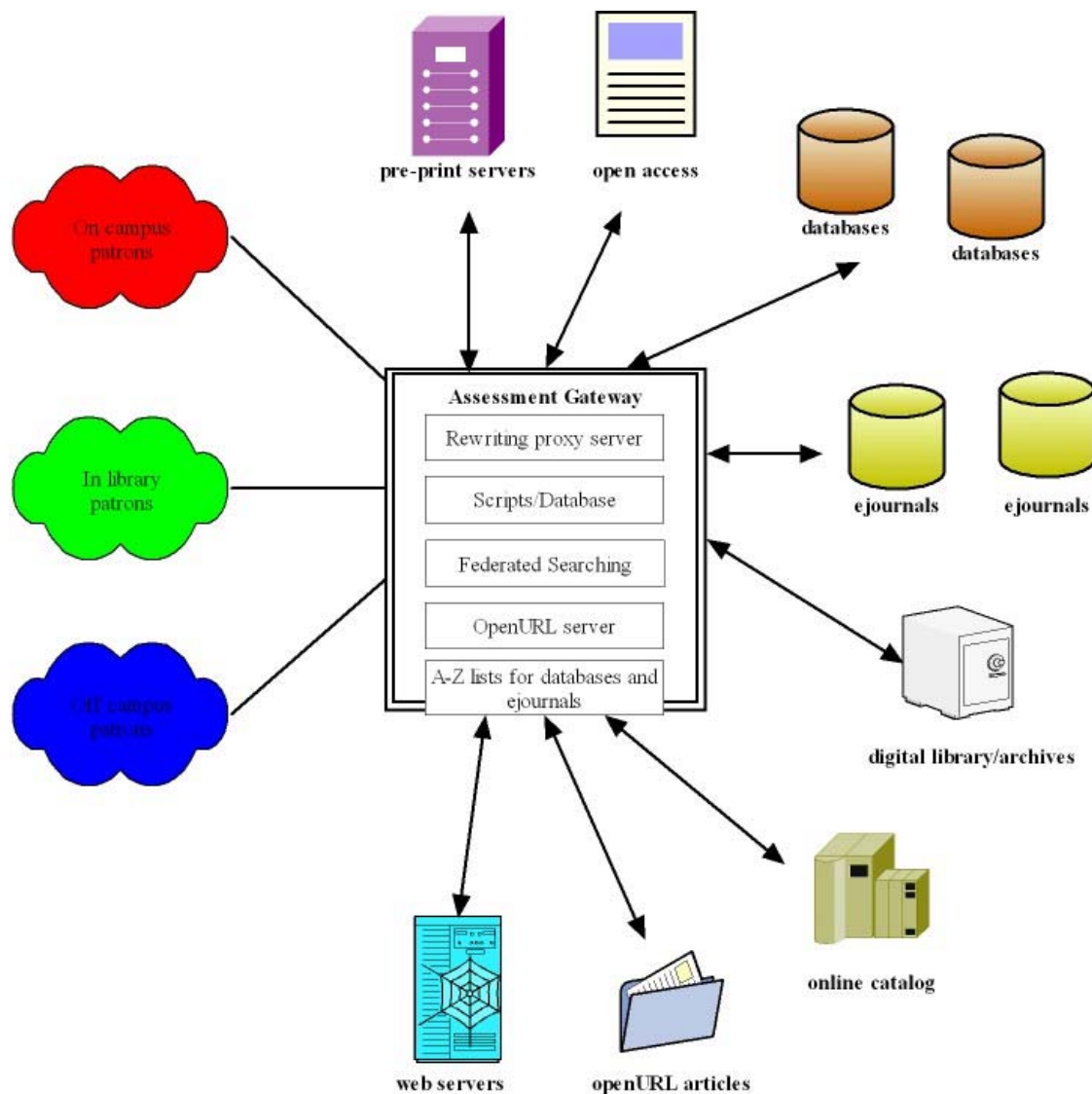
Figure 2. The Assessment Gateway

Assessment Gateway

     Building on the infrastructure of assessment is the assessment gateway.
Most of the existing gateways for library resources exist not for assessment purposes, but
to solve other problems. Rewriting proxy servers provide off-site access for electronic
resources, and incidentally serve as a gateway through which all patrons must pass.
XHTML databases and ejournal alphabetical and subject lists are created by scripts and
databases or XML to solve the problem of updating XHTML and to increase consistency
across the web site. OpenURL servers link journal articles through DOIs to citations in
databases to leverage the availability of the ejournals, to reduce the cost/use by increasing
use, and to offer a powerful access tool.

Yet, with an assessment infrastructure, the library web architecture could be planned to include the collection of counter and web survey data. Such data would be consistent not only across disparate databases but also across disparate services, such as the varied components of digital libraries. An assessment infrastructure would run all patron requests for ejournals and for local digital collections through the same gateway, collecting commensurable data. It could also reach across digital formats, providing data for movies, sound files, graphics, office applications, as well as text or Acrobat files. The library would highlight the digital libraries, pre-print servers, open access journals, institutional repositories, and other databases and ejournals containing freely searchable and downloadable material. As patrons used the library's links to these sources, the usage would be captured in the assessment gateway.   Relationships would build up, not only between the libraries and information providers, as has been the case with the standards-setting institutions, but also between libraries and the various open services.

MINES for Libraries[TM] is a web-based survey, building on local infrastructures of assessment, that can be used to query all types of networked electronic services offered by a library. It has been employed at more than thirty North American libraries in the last two years and offers libraries local flexibility in the types of questions asked and the types of local outcomes to be measured.

MINES Results from Academic Health Sciences Libraries in the United States

Seven academic health sciences in the United States implemented the MINES methodology between January, 2003 and April, 2005 as part of a larger, more comprehensive library cost analysis study. The specific purpose for the MINES web survey was to determine the extent of usage of networked electronic resources for supporting sponsored research activities. More than 27,000 uses of networked electronic services, including databases, indexes, online public access catalogs, electronic journals, electronic document delivery and interlibrary loan, and electronic books were surveyed. Some of the studies are ongoing, some represent the full year sample, so data are still being collected.   Approximately 33% of the networked electronic services uses at these academic health sciences libraries were related to sponsored research projects; 37% were related to instruction, education, and unfunded research.

As Table 1 demonstrates, sponsored researchers at these seven health sciences libraries used networked electronic services most frequently from on-campus, but not from within the library. Approximately 93% (8,525 of 9,155) of sponsored research use took place on-campus (including in the library). While 24% of all networked resource use occurred within the library; only 17% of funded research use of networked resources actually took place in the library (1,566 of 9,155).

Table 1
Purpose of Use By Location
Academic Health Sciences Libraries

	Funded Research	Instruction	Patient Care	Other Activities	Total
IN THE LIBRARY					
LIBRARY 1	1,186	1,188	301	897	3,572
LIBRARY 2	216	380	75	317	988
LIBRARY 3	72	289	60	245	666
LIBRARY 4	31	264	37	61	393
LIBRARY 5	22	208	42	83	355
LIBRARY 6	14	48	19	85	166
LIBRARY 7	25	274	33	118	450
TOTAL	**1,566**	**2,651**	**567**	**1,806**	**6,590**
	24%	**40%**	**9%**	**27%**	**100%**
ON-CAMPUS, NOT IN THE LIBRARY					
LIBRARY 1	3,010	1,860	750	882	6,502
LIBRARY 2	2,175	1,173	546	366	4,260
LIBRARY 3	803	769	289	156	2,017
LIBRARY 4	437	366	158	41	1,002
LIBRARY 5	228	477	274	119	1,098
LIBRARY 6	145	179	68	35	427
LIBRARY 7	161	241	151	89	642
TOTAL	**6,959**	**5,065**	**2,236**	**1,688**	**15,948**
	44%	**32%**	**14%**	**10%**	**100%**
OFF-CAMPUS					
LIBRARY 1	119	412	205	334	1,070
LIBRARY 2	252	739	240	147	1,378
LIBRARY 3	83	286	97	236	702
LIBRARY 4	57	286	89	35	467
LIBRARY 5	62	465	214	84	825
LIBRARY 6	50	120	29	63	262
LIBRARY 7	7	97	10	34	148
TOTAL	**630**	**2,405**	**884**	**933**	**4,852**
	13%	**50%**	**18%**	**19%**	**100%**

Table 1 (continued)
Purpose of Use By Location
Academic Health Sciences Libraries

	Funded Research	Instruction	Patient Care	Other Activities	Total
TOTAL					
LIBRARY 1	4,315	3,460	1,256	2,113	11,144
LIBRARY 2	2,643	2,292	861	830	6,626
LIBRARY 3	958	1,344	446	637	3,385
LIBRARY 4	525	916	284	137	1,862
LIBRARY 5	312	1,150	530	286	2,278
LIBRARY 6	209	347	116	183	855
LIBRARY 7	193	612	194	241	1,240
TOTAL	**9,155**	**10,121**	**3,687**	**4,427**	**27,390**
	33%	**37%**	**13%**	**17%**	**100%**

At these academic health sciences libraries, the classifications of networked electronic services users varied significantly based on their location (see Table 2). Within the library, faculty and staff usage represented about 46% of total use and graduate student usage accounted for about 31% of use. On-campus, but not in the library, faculty and staff represented 53% of all usage, clinical and other users accounted for about 26% of the usage, and graduate students totaled about 20% of the usage. Off campus, faculty and staff accounted for about 48% of networked electronic services usage; clinical/other users and graduate students each represented about 25% of off-campus networked electronic services usage.

Table 2
Classification of Users by Location
Academic Health Sciences Libraries

	Undergraduate Students	Graduate Students	Faculty/ Staff	Other Users	Total
IN THE LIBRARY					
LIBRARY 1	38	1,025	1,769	902	3,734
LIBRARY 2	163	349	455	17	984
LIBRARY 3	62	117	296	102	577
LIBRARY 4		311	138	52	501
LIBRARY 5	19	151	166	19	355
LIBRARY 6	27	98	87	42	254
LIBRARY 7	108	91	199	16	414
TOTAL	**417**	**2,142**	**3,110**	**1,150**	**6,819**
	6%	**31%**	**46%**	**17%**	**100%**

Table 2 (continued)
Classification of Users by Location
Academic Health Sciences Libraries

	Undergraduate Students	Graduate Students	Faculty/ Staff	Other Users	Total
ON-CAMPUS, NOT IN THE LIBRARY					
LIBRARY 1	10	1,500	4,016	4,822	10,348
LIBRARY 2	117	1,085	2,931	53	4,186
LIBRARY 3	40	463	1,224	79	1,806
LIBRARY 4	??	231	647	38	916
LIBRARY 5	46	303	744	5	1,098
LIBRARY 6	44	151	372	62	629
LIBRARY 7	34	90	465	10	599
TOTAL	**291**	**3,823**	**10,399**	**5,069**	**19,582**
	1%	**20%**	**53%**	**26%**	**100%**
OFF-CAMPUS					
LIBRARY 1	16	205	325	589	1,135
LIBRARY 2	147	703	497	125	1,472
LIBRARY 3	18	205	325	589	1,137
LIBRARY 4	??	114	218	106	438
LIBRARY 5	47	495	230	51	823
LIBRARY 6	14	81	126	114	335
LIBRARY 7	21	50	49	22	142
TOTAL	**263**	**1,853**	**1,770**	**1,596**	**5,482**
	5%	**34%**	**32%**	**29%**	**100%**
TOTAL	**971**	**7,818**	**15,279**	**7,815**	**31,883**
	3%	**25%**	**48%**	**24%**	**100%**

MINES Results from Academic Main Campus Libraries in the United States

At the seven main campus libraries, sponsored research use represented 11% of total electronic services use, as compared to the 33% sponsored research use found in academic health sciences libraries. Approximately 84% (2,502 of 2,971) of the sponsored research uses of networked electronic resources occurred outside the library, (as compared to 93% for academic health sciences libraries), while 64% of all electronic services use took place outside the library (as compared to 76% for academic health sciences libraries) (see Table 3).

Table 3
Purpose of Use By Location
Academic Main Libraries

	Funded Research	Instruction	Other Sponsored Activities	Other	Total
IN THE LIBRARY					
LIBRARY 8	98	694	72	335	1,199
LIBRARY 9	78	1,492	95	393	2,058
LIBRARY 10	55	1,110	78	577	1,820
LIBRARY 11	38	734		211	983
LIBRARY 12	110	590		333	1,033
LIBRARY 13	17	1,465		535	2,017
LIBRARY 14	73	322	35	193	623
TOTAL	**469**	**6,407**	**280**	**2,577**	**9,733**
	5%	**66%**	**3%**	**26%**	**100%**
ON-CAMPUS, NOT IN THE LIBRARY					
LIBRARY 8	256	459	32	161	908
LIBRARY 9	349	1,652	92	242	2,335
LIBRARY 10	100	695	20	210	1,025
LIBRARY 11	266	634		84	984
LIBRARY 12	510	1,627		364	2,501
LIBRARY 13	189	593		211	993
LIBRARY 14	335	265	7	107	714
TOTAL	**2,005**	**5,925**	**151**	**1,379**	**9,460**
	21%	**63%**	**2%**	**14%**	**100%**
OFF-CAMPUS					
LIBRARY 8	74	316	24	174	588
LIBRARY 9	108	1,431	50	326	1,915
LIBRARY 10	26	1,192	37	1,492	2,747
LIBRARY 11	69	357		62	488
LIBRARY 12	89	462		345	896
LIBRARY 13	20	451		104	575
LIBRARY 14	111	301	21	148	581
TOTAL	**497**	**4,510**	**132**	**2,651**	**7,790**
	6%	**58%**	**2%**	**34%**	**100%**
TOTAL					
LIBRARY 8	428	1,469	128	670	2,695
LIBRARY 9	535	4,575	237	961	6,308
LIBRARY 10	181	2,997	135	2,279	5,592
LIBRARY 11	373	1,725		357	2,455
LIBRARY 12	709	2,679		1,042	4,430
LIBRARY 13	226	2,509		850	3,585
LIBRARY 14	519	888	63	448	1,918
TOTAL	**2,971**	**16,842**	**563**	**6,607**	**26,983**
	11%	**62%**	**2%**	**25%**	**100%**

At the main campus libraries, there were about 1.8 networked resources uses outside the library for each use inside the library. The difference was even more pronounced at academic health sciences libraries, where there were roughly 3 networked resources uses outside the library for each use inside the library.

At the main campus libraries, inside the library, undergraduate student use of networked electronic resources was heavy, representing 43% of all in-house use. On-campus, but not in the library, graduate student usage was heaviest (40%) followed by faculty/staff (31%) and undergraduate students (25%). Off-campus use of networked electronic resources was heaviest by other users (40%), primarily those users not affiliated with the university offering the resources (see Table 4).

Table 4
Classification of Users by Location
Academic Main Libraries

	Undergraduate Students	Graduate Students	Faculty/ Staff	Other Users	Total
IN THE LIBRARY					
LIBRARY 8	524	158	162	45	889
LIBRARY 9	516	609	454	148	1,727
LIBRARY 10	727	424	460	238	1,849
LIBRARY 11	530	108	190	76	904
LIBRARY 12	398	213	354	70	1,035
LIBRARY 13	1,016	491	426	94	2,027
LIBRARY 14	264	193	230	54	741
TOTAL	**3,975**	**2,196**	**2,276**	**725**	**9,172**
	43%	**24%**	**25%**	**8%**	**100%**
ON CAMPUS, NOT IN THE LIBRARY					
LIBRARY 8	140	228	171	18	557
LIBRARY 9	561	734	655	75	2,025
LIBRARY 10	364	318	283	94	1,059
LIBRARY 11	247	398	78	9	732
LIBRARY 12	679	1,141	765	20	2,605
LIBRARY 13	91	372	494	43	1,000
LIBRARY 14	166	334	326	34	860
TOTAL	**2,248**	**3,525**	**2,772**	**293**	**8,838**
	25%	**40%**	**31%**	**4%**	**100%**

Table 4 (continued)
Classification of Users by Location
Academic Main Libraries

	Undergraduate Students	Graduate Students	Faculty/ Staff	Other Users	Total
OFF CAMPUS					
LIBRARY 8	110	123	37	92	362
LIBRARY 9	294	815	288	242	1,639
LIBRARY 10	255	284	146	2,274	2,959
LIBRARY 11	130	117	60	64	371
LIBRARY 12	207	256	147	286	896
LIBRARY 13	324	153	70	38	585
LIBRARY 14	260	404	123	89	876
TOTAL	**1,580**	**2,152**	**871**	**3,085**	**7,688**
	21%	**28%**	**11%**	**40%**	**100%**
TOTAL	**7,803**	**7,873**	**5,919**	**4,103**	**25,698**
	30%	**31%**	**23%**	**16%**	**100%**

MINES Results from the Ontario Council of University Libraries in Canada

Canadian Libraries are heavily engaged in jointly licensing networked electronic resources through consortium purchases. Canadian libraries have access to a number of electronic resources through the Canadian National Site Licensing Project and also through more local consortial purchases.

The Ontario Council of Libraries (OCUL) launched its Scholar's Portal in 2001 as the major component of its Ontario Information Infrastructure (OII). The Scholar's Portal provides access to networked electronic resources purchased consortially by 20 Ontario universities, known collectively as The Ontario Council of Libraries. OCUL's assessment team partnered with the Association of Research Libraries Statistics and Measurement Program in 2004-2005 on a project to help assess the value of networked electronic services jointly licensed by OCUL. The goals of the project were:

- To capture in-library and remote web usage of the OII Scholars Portal in a sound representative sample using the MINES methodology;

- To identify the demographic differences between in-house library users as compared to remote users by status of user;

- To identify users' purposes for accessing Scholars Portal electronic services (funded research, non-funded research, instruction/education use, student research papers and course work); and

- To develop an OII infrastructure to make studies of patron usage of OCUL networked electronic resources routine, robust and integrated into the decision-making process.

All but one OCUL member agreed to survey its networked resources users using the MINES for Libraries[TM] methodology. OCUL –licensed electronic resources are mounted on a central server at the University of Toronto and the user survey was conducted over the course of a year during one randomly scheduled two hour survey period each month. Because retrospective Scholar's Portal usage totals were available by day of the week and time of day, the probability of a particular day of the week and time of day was weighted accordingly to ensure a representative sample.

More than 20,000 networked electronic resource uses through the Scholar's Portal were sampled between May, 2004 and April, 2005. As Table 5 illustrates, the largest category of users was undergraduate students (46%), followed by graduate/professional students

Table 5

OCUL Scholars Portal Users By Classification	**Frequency**	**Percent**
FACULTY	2,261	11.14%
GRADUATE/ PROFESSIONAL STUDENT	6,545	32.24%
LIBRARY STAFF	328	1.61%
OTHER	721	3.55%
STAFF	1,128	5.56%
UNDERGRADUATE	9,317	45.90%
TOTAL	**20,300**	**100%**

More than 80% of the Scholar's Portal uses sampled originated from outside OCUL libraries (see Table 6). Off-campus use represented more than 45% of all networked electronic resource usage; almost 35% originated on-campuses, but not in the library.

Table 6

OCUL Scholars Portal Users By Location	**Frequency**	**Percent**
IN THE LIBRARY	4,047	19.94%
OFF-CAMPUS	9,163	45.14%
ON-CAMPUS, BUT NOT IN THE LIBRARY	7,090	34.92%
TOTAL	**20,300**	**100%**

The purpose of use categories selected by OCUL were slightly different from those selected by U.S. libraries (See Table 7). At the Ontario libraries, roughly 26% of all Scholar's Portal use was related to sponsored research. Almost half (47.69%) pertained to coursework or teaching.

Table 7

OCUL Scholars Portal Users By Purpose of Use	Frequency	Percent
COURSEWORK	8,537	42.05%
OTHER ACTIVITIES	1,523	7.50%
OTHER RESEARCH	3,290	16.21%
PATIENT CARE	487	2.40%
SPONSORED RESEARCH	5,318	26.20%
TEACHING	1,145	5.64%
TOTAL	**20,300**	**100%**

Lastly, the academic affiliations of the Scholar's Portal users sampled in the study were determined. Of the 20,300 Scholar's Portal uses sampled in 2004-2005, more than 37% were from users in the sciences and applied sciences. Sciences and applied sciences users, when combined with health sciences users, totaled almost 60% of all Scholar's Portal uses, while humanities and fine arts user accounted for only about 4% of all uses (see Table 8).

Table 8

OCUL Scholars Portal Users By Affiliation	Frequency	Percent
APPLIED SCIENCES	2,930	14.43%
BUSINESS	814	4.01%
EDUCATION	881	4.34%
ENVIRONMENTAL STUDIES	867	4.27%
FINE ARTS	160	0.79%
HUMANITIES	600	2.96%
LAW	117	0.58%
MEDICAL HEALTH	4,391	21.63%
OTHER	948	4.67%
SCIENCES	4,698	23.14%
SOCIAL SCIENCES	3,894	19.18%
TOTAL	**20,300**	**100%**

Conclusion

The networked electronic information environment can yield robust usage data for collection development and other management decisions. Standardized usage data, including the recently published Release 2 of the COUNTER Code of Practice for Journals and Databases (http://www.projectCounter.org) allows librarians to objectively compare the value of vendors' electronic offerings to their constituencies utilizing frequency of use.

The networked electronic information environment also affords an opportunity to assess characteristics of other types of networked electronic information usage in real-time, including open access materials or freely available web resources that are utilized by faculty and students in an academic environment. Networked services data collection is more comprehensive when a library adopts an infrastructure of assessment, or a gateway architecture, to networked electronic services.

The MINES for Libraries[TM] methodology permits librarians to gauge the demographic characteristics of users, their location, the date and time of use, the specific resource used, and their purpose of use as they actually utilize an electronic resource. Other usage measures are also possible, and results can be presented either as frequencies (illustrated in this paper by OCUL results) or by cross-tabulating different measures (such as location and either purpose of use or classifications of users, as illustrated in this paper by results from U.S. libraries).

The MINES for Libraries[TM] methodology is already being used by American libraries to   determine to what extent electronic resources of all kinds support sponsored research, instruction, and other key academic endeavors. It has been employed by a Canadian consortium of libraries to assess the value of jointly licensed electronic products to its broad range of constituents. The methodology also permits a library to analyze, resource by resource, electronic services' usefulness to different constituencies and different institutional missions. When used responsibly, this data can give librarians tremendous insight into how their electronic resources are being used.

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