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Diplomarbeit

Rethinking OPAC and web-mediated Library Services – Placement and Integration, Enrichment and Enhancement, Social Computing and Web 2.0

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Abstract

Current research shows that only a minority of undergraduate and graduate students is initially addressing the services offered at their affiliated institutional libraries when searching for information.

Instead, 89% of college students begin information searches by consulting a commercial search engine on the open web, with 62% using Google as the most recent choice.

This raises concerns throughout librarianship, as web-mediated library services are established to provide dedicated audiences with access to owned and offered assets and the high-quality information stored within, and by-passing the provided services places in jeopardy the financial spending and library collections themselves.

Therefore revitalizing strategies have to be observed in order to remain relevant to contemporary information customers, and it is advised to rethink the offered services while concentrating on quite more user-centric approaches – in short, focusing on users and uses.

Karen Calhoun, librarian for technical services at Cornell University Library, is providing us with several possible options and actions, leading to the three key strategies discussed in this paper.

SWD keywords:

Library Services, Commercial Search Engines, Placement, Integration, Enrichment, Enhancement, Social Computing, Web 2.0

List of Abbreviations

A&I	Abstracting and Indexing
CMS	Course Management System
CSE	Commercial Search Engine
FRBR	Functional Requirements for Bibliographic Records
ILS	Integrated Library System
IR	Institutional Repository
MARC	Machine Readable Cataloging
OPAC	Online Public Access Catalog
SBS	Social Bookmarking Service
SNS	Social Networking Site(s)
VLE	Virtual Learning Environment
VTNA	Vanderbilt Television News Archive

1 Introduction

1.1 Web-mediated Services provided by Academic Libraries

To begin with, a portrait of the services provided by academic or institutional libraries, speaking of libraries that are providing their services primary to user groups at universities and institutions of further and higher education, for the purpose of discovery and delivery of bibliographic data, scholarly material and scientific information, shall give a more detailed view on the current library information landscape. As all of these services are accessible to users via the World Wide Web, they are referred to as web-mediated library services.

1.1.1 Online Public Access Catalog

The Online Public Access Catalog (OPAC) has long been the keystone of library automation, and per definition the term refers to a database composed of bibliographic records describing tangible materials owned and offered by a library or library system, searchable by several modes.[1]

As electronic library catalogs derived historically from traditional card catalogs, the contained records do not represent the entirety of library resources, but focus on local physical collections and manage description for mostly published print materials.

[1] cp. http://lu.com/odlis, last visited on the 2nd February 2007

Metadata describing those collections is coded into a machine-readable cataloging format (MARC), providing dedicated fields and subfields to enter Author, Title, Abstract/Summary, Subjects (usually based on the Library of Congress Subject Headings), Selected Keywords, Edition, Format, Place of Publication, Year of Publication, Publisher, Language, ISBN/ISSN, call number and other metadata elements.

The graphical user interface of an OPAC is generally accessible to users by pointing their web browser to the library homepage, and when conducting a search, these MARC fields provide the foundation for the index a user query is matched against. Individual MARC records are created according to strict standards that are set out in cataloging rules librarianship has agreed on, today essentially the same that had been in use since the early 19th century, and therefore it is important to note that MARC format has proven to be inadequate to describe electronic content and digital material.[2]

In order to compensate for this deficiencies, new metadata and cataloging standards such as the Dublin Core Metadata Standard or the Functional Requirements for Bibliographic Records (FRBR) have been developed, providing more flexible schemas and additional metadata elements such as file type, source code/URL, and related copyright issues to specify digital intangible material.

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[2] For example the Anglo-American Cataloging Rules used by the American Library Association, the Canadian Library Association and the Chartered Institute of Library and Information Professionals in the United Kingdom.

Still, due to the high effort and costs it would take to convert the millions of MARC records in thousand of databases around the world to new metadata structures, it feels that MARC format will continue to play a prominent role.[3]

1.1.2 Electronic Resources

Even as physical materials are still relevant, electronic counterparts of print material are becoming increasingly important to scholars, students and publishers.[4]

In response, academic libraries are providing their audiences with access to electronic resources from several information providers, such as publishers, retrieval services and individual copyright holders. While this might be varying, in general the electronic resources available are displayed on the websites of an institutional library, categorized and described after certain criteria likewise subject or discipline, accessible to users by clicking-through to the desired resource via a hyperlink.

From here, available information can be accessed by interacting with individual search interfaces deployed by the different information providers, and therefore there exist several fragmented "information silos" on the library information landscape, each with its own tools for identifying and obtaining electronic material.[5]

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[3] cp. CALHOUN 2006, p.32

[4] cp. OCLC REPORTS 2003, p.4

[5] cp. BSTF 2005, p.2

File types by which a user is presented with electronic material are usually platform independent HTML and PDF documents, as they are widespread and well accepted, but other proprietary formats like RealPage are also in use.[6]

This virtual library landscape is in a broader sense often referred to as "Digital Library", and may account archives, patents, e-journals, abstracting and indexing services, e-books, institutional repositories and open access collections.

Whereas many of these electronic resources are managed and maintained independently by the individual information providers, there also exist so-called aggregators that are providing central access to electronic material that originated from different resources.

Nowadays, large aggregators negotiate with hundreds of publishers and copyright holders, and the largest aggregators of scientific e-journals in the United States are EBSCO, Rowe, Ingenta, OCLC and ProQuest.[7] Even as information providers and aggregators are specialized on specific subjects and disciplines, they all contain a set of identical resources, and EBSCO has recently been offering higher up-front payments to publishers and copyright holders in order to secure exclusivity of certain selected scientific journals.[8]

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[6] cp. HUBER 2000, p.3

[7] cp. ARMS 2002, p.93

[8] cp. http://lu.com/odlis, last visited on 19th of March 2007

Besides, large publishers are acting as aggregators themselves, and publishing houses such as Academic Press, Blackwell Science, Elsevier, Kluwer Academic Publishers, John Wiley & Sons or Springer Science are offering access to the numerous individual titles and publications they are releasing from one single interface, making the current library information landscape a complex and diffuse combination of information resources and services, from which only some are actively managed by institutional libraries.[9]

As this makes clear, library catalogs reflect only a small portion of materials and services owned and offered by an institutional library for the purpose of discovery and delivery of bibliographic data, scholarly material and scientific information, and patrons can make use of an wide array of resources.

While some of these services, i.e. open access collections and institutional repositories, are available to anyone whom it might concern, most of the offered services are based on subscriptions and license agreements (terms and conditions) between copyright holders, and institutional libraries are practically only acquiring the permission to redirect their patrons to make use of those resources and the contained material.

Accordingly, there is a need to confirm the identity of individuals interacting with those resources, as only eligible user groups (i.e. members, patrons, students, faculty, staff) are allowed access and usage of licensed content.

[9] cp. DAGAR 2001, p.6

Whereas library users in a physical environment are borrowing out tangible items by identifying at the checkout counter, moving intellectual property around in digital formats is creating challenges for academic libraries.[10]

Focusing on institutional or academic libraries that are providing their services primary to large user groups at educational institutions and universities, OPACs and Electronic Resource Management Systems are usually an integrated part of a suite of software customized to the individual requirements by commercial vendors supplying specialized technology and software for library automation. This suite of software, commonly referred to as Integrated Library System (ILS), can be regarded as the technological backbone of library operations and services, as they are involved in every aspect of library work, from acquisitions to cataloging and from circulation to web-based reserves.[11]

In the following, selected electronic resources offered at academic libraries are described in more depth:

e-journals

As traditional publishing models are being replaced, electronic counterparts of scientific journals, referred to as e-journals, are becoming a substantial part of the scholarly information landscape. Like for all other electronic resources, advantages are anytime and anywhere availability, chance of usage for multiple simultaneous users, and the elimination of physical storage requirements.

[10] cp. MCLEAN 2004, p.4

[11] cp. KENNEY 2003, p.1

While some journals such as the Journal of High Energy Physics or the Internet Journal of Chemistry are published exclusive in electronic format, most publishers rely on online-before-print business models, offering access to pre-print versions in advance to the release of traditional print issues. For example publishers like Springer Science offer "Online First" services via their aggregators, allowing access to publications that are not available in traditional print formats yet.

Open Access Collections

Back in the year of 1994, Stevan Harnad wrote a proposal for electronic publishing, arguing that all academics should make their research articles publicly available through open repositories.[12] By 2006, Open Access Collections are becoming a sophisticated alternative, as scholars, students and researchers are increasingly participating in this form of electronic publishing model. Known as Open Access Movement or Peer Publishing, the main advantages and key characteristics here are lowered barriers for access and usage, by making materials and documents freely and publicly available. A prominent example in the field of Library and Information Science is METALIS, an aggregator covering resources in several languages and from various open access repositories, such as DLIST (containing over 20,000 documents, hosted at the University of Arizona), ArXiv (containing over 400,000 e-prints in Physics, Mathematics, Computer Science and Quantitative Biology hosted at the Cornell University Library) as well as ELIS (containing over 5,300 scientific or technical documents).

[12] DAVIS 2007, p.2

Institutional Repositories

Multiple electronic repositories have been developed within universities, and institutional libraries aggregate those databases created and maintained at their affiliated organizational institution into their information landscape, commonly referred to as institutional repositories (IR). According to Clifford Lynch, Director of the Coalition for Networked Information, an IR is defined as a set of services that a university offers for the management and dissemination of digital materials created by the institution and its community members.[13]

Typically IRs such as OPUS and DSpace contain diploma thesis and dissertations, but may further be helpful to disseminate so-called grey literature - documents such as pamphlets, bulletins, conference presentations, white papers, local research projects, tutorials, scripts, as well as other materials that are typically ignored by traditional publishers.

Abstracting and Indexing

Commercial Abstracting and Indexing (A&I) services provide bibliographic citations and abstracts of published literature, also referred to as bibliographies, and can be comprehensive or selective within a specific academic discipline or sub discipline. In distinction to publishers and retrieval services that are offering access to full-text sources, commercial A&I services are only listing bibliographic information and a brief summary/abstract describing the content of available documents, mainly journals and related electronic counterparts.

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[13] DAVIS 2007, p.2

Typically each scientific discipline relies on dedicated A&I services to find information on specific journals and articles, and while bibliographies used to be issued serially in print formats in the past, usually in monthly or quarterly supplements, today they are mainly published online through bibliographic databases.[14]

For example the database of Library and Information Science Abstracts is considered the most important international bibliography within Library and Information Science, evaluating 440 journals from more than 68 countries in over 20 languages, giving bibliographic citations and abstracts for almost every contained journal article.

Further prominent databases among A&I services are the Chemical Abstracts, the Science Citation Index, or the Information Science and Technology Abstracts.

[14] cp. ARMS 2000, p.190 and http://lu.com/odlis, last visited on the 20th February 2007

1.2 Perception of Web-mediated Library Services

For most over the last thirty-five years students and casual researchers have been well served by library catalogs and their complements.[15] A glimpse at the past decades shows, that long before the outcome of the internet age, as soon as in the early 1980s, a critical mass of OPAC deployment had been achieved across the United States, and 80% of library users held favorable views of this new form of catalog, which clearly represented advantages compared to traditional non-electronic card catalogs.

Until the development and mass acceptance of the World Wide Web around the mid-1990s, students and information seekers depended almost exclusively on OPACs, whereas, as personal computers and individual households had not been online to the same degree as today, they could not get access to them without physically accessing the library.

Further, shifts in the production of print materials have occurred, resulting in a strong trend towards electronic production and away from traditional paper documents, and whereas 30 % of all titles listed in the databases of the A&I service Science Citation Index had been available in digital format in 1998, more than 70% of these publications were available electronically at the end of 2002.[16]

[15] cp. CALHOUN 2006, p.23

[16] cp. OCLC 2003, p.4

With the development of the World Wide Web, Internet and information technology, circulation rates of physical materials held at libraries have been steadily declining, finally declining over 50% during the last twelve years, and by 2005 the search engine Google registered 700 times as much search queries on a daily basis than the online catalog of the University of California served on a monthly basis.[17]

In the same year the Online Computer Library Center (OCLC) published a survey researching the perception of libraries and other information services. Results show that only 2% of participating college students, both undergraduate and graduate, begin a research directly at the library website or an online database provided at their affiliated institutional library, while 87% of college students are aware of the existence of library homepages, 86% of OPACs, 71% of online reference materials and 62% of online databases. Instead, 89% of college students begin information searches by consulting a search engine, with 62% using Google as the most recent choice.

In addition, a worrisome number of students are never making use of the services provided at their institutional library at all, as 8% of students have never made use of the library website, 10% of OPACs, 12% of e-journals, 15% of online full-text databases as well as online reference material, and even 25% of e-books.[18]

[17] cp. NEXTSPACE 2006, p.8 and cp. MARKEY 2007, p.2,3

[18] cp. OCLC 2005, p.18

Further researches on the usage of academic resources and student's information seeking strategies conducted in cooperation by the Centre for Research in Library and Information Management and the Centre for Advanced Studies and Learning Technologies show similar results, revealing that more than two-thirds of undergraduate and graduate students get information daily from popular search engines. In contrast, student's usage of electronic resources offered at academic libraries is low, while only participants enrolled in information and library management studies had been using library services more frequently for locating and obtaining information.[19]

As these figures show, usage is declining, popularity is low, and library services currently provided are not the preferred starting point for the majority of eligible users.

[19] cp. GRIFFITHS 2005, p.3,5

1.3 Revitalizing web-mediated Library Services

A lot is spent, speaking of effort and money, in order to establish and maintain web-mediated library services, and the above-mentioned observations raise concerns throughout librarianship. In the year 2000, library spending worldwide totaled about 29 billion U.S. Dollars, and on average 3% of this amount have been spent on subscriptions to information providers and electronic resources. Summing up to almost one billion U.S. Dollars in only one year, this amount is expected to rise, as more and more content is born in digital formats and traditional publishing models are being replaced.[20]

But even more important than the financial aspects seems to be the fact that library services are established to provide dedicated audiences with access to owned and offered assets and the high-quality information stored within, and by-passing the provided services places in jeopardy the collections themselves.

Based on this, revitalizing strategies have to be observed in order to remain relevant to contemporary information customers in an ever-changing information landscape.[21]

Today, it is a well accepted necessity throughout the economy and business world to offer a maximum of customer orientation, becoming the core of business success, compensating for outdated concepts that had been focusing on sheer product and organization centric approaches.

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[20] cp. OCLC 2003, p.10

[21] cp. BSTF 2005, p.41

This business model certainly has to be adopted by librarianship, as library services and websites of academic libraries are generally organized around functions and resources, and the majority of current library services were not designed for the users and their information needs, but out of the needs of institutional libraries, ILS vendors and information providers.[22]

Therefore it is advised to rethink the library information landscape and the way web-mediated library services are currently provided, observing quite more user-centric approaches while concentrating on the array of offered and owned web-mediated services – in short, focusing on users and uses.[23]

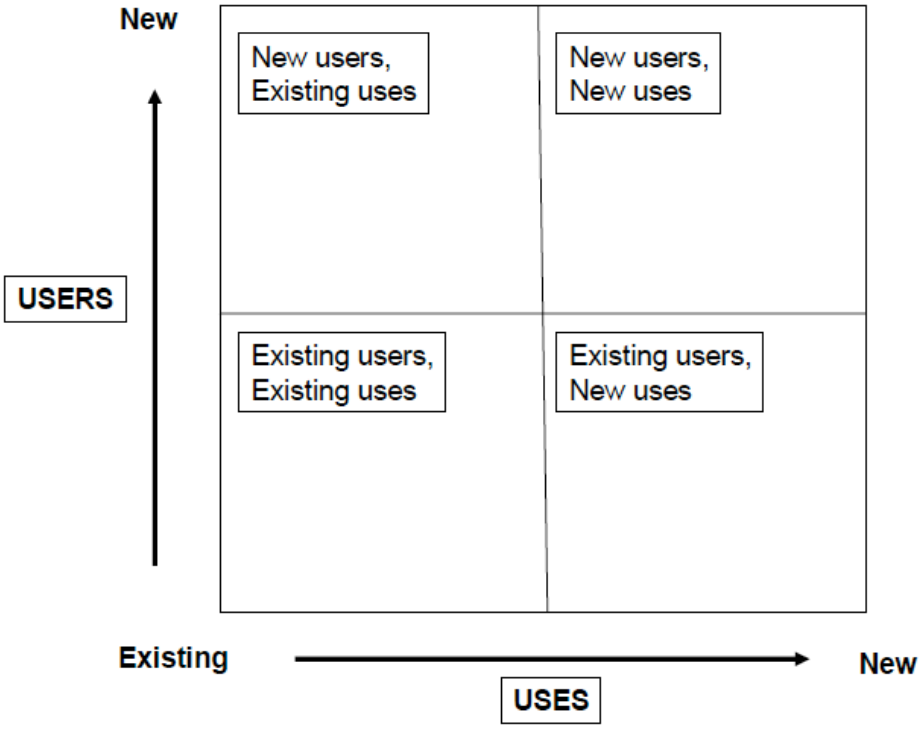
[22] cp. MACAULAY 2006, p.10 and DEMPSEY 2003, p. 3

[23] cp. PERFETTI 2006, p.1

1.3.1 Key Strategies

Karen Calhoun, librarian for technical services at the academic library at Cornell University, is providing us with several possible options and actions in relation to the economist and editor Theodore Levitt and his successors in the business world.[24] While these are presented in the context of revitalizing library catalogs, they can be extended to cover further web-mediated library services offered at individual institutional libraries.

As it is observed that library services have to be revitalized to some degree - the quadrant on the lower left, combining existing uses and existing users - is not discussed any further, leading to the three key strategies discussed in this paper.



[24] cp. CALHOUN 2006, p.11

2 New Users, Existing Uses - Placement and Integration into Selected Environments

Obviously libraries are not in the position to wait for their users to come in order to use their services, and in contrast to more traditional approaches of building dedicated websites and expecting for users to come and find to these, it is advised to make existing library services available within selected environments.

Academic libraries are an essential part of their affiliated institution, and as campus portals and course management systems are potentially high frequented by students, it seems obvious that placement and integration of library services into these environments would represent a big change for the pattern of usage.[25] Investigations carried out by the Contextual Resource Evaluation Environment Project show a strong interest of students to make use of library services when presented within virtual institutional environments, as far over 50% state that they likely or very likely would make use of bibliographic databases and electronic resources when made available.[26]

[26] cp. CREE 2005, p.10

In addition, libraries need to promote themselves and their services, as they are no longer the sole or most accessible provider of information, and it feels equally important to examine possibilities for placement and integration of library services within commercial search engines.[27]

Being by far the preferred entry point to the information landscape, CSEs must not be regarded as a competitor that is attracting former customers, but as a companion that may help leading information seekers to library services. While students indeed turn towards commercial search engines in the first place, around 50% of college students come across library sources when conducting a search with a commercial search engine, and 41% of them click-through to use the displayed library source.[28] Research shows also that searching Google provides users with leads into more subject-specific and structured results, and it might be at this stage that they are then making use of additional resources like online library services.

Therefore it should be in the aim of institutional libraries, like for any other organization that is trying to promote their products on the World Wide Web, to show presence within Search Engine Result Pages (SERPs), and it feels necessary to grasp a closer look on commercial search engines and the information they can actually aggregate.[29] Basically, all popular CSEs aggregate their indexes with the help of web crawlers.

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[27] cp. DAGAR 2001, p.6

[28] cp. OCLC 2005, p.34

[29] cp. CREE 2005, p.11

Also known as web spiders or web robots, this can be regarded as automated browsers, a program or software agent that is harvesting the World Wide Web by following the hyperlinks it comes across.

Google, with over 60% of the market share the most important CSE to be considered, as well as others offer submission programs that make it possible to submit websites to the companies which are deploying the search engines, in order to activate a visit from their web crawlers.

Web crawlers do not conduct searches on search interfaces they come across, and naturally cannot harvest websites and contained information which are password protected, behind firewalls or for other reasons not publicly available.

Thus, the information that is available to users on the World Wide Web has to be divided into two categories:

One the one hand the open web, also called surface web or visible web, referring to websites that are accessible publicly through commercial search engines and via web browsers. And on the other hand, the information stored inside library resources and databases, referred to as deep web or invisible web, only accessible via dedicated search interfaces and by eligible user groups. With worldwide more than 40,000 OPACs, over 10,000 e-journals and an uncountable array of further databases restricted for public use, it is believed that the size of the deep web is several times bigger than the size of the surface web, estimated to be from 2 to 50 times larger.[30]

Based on this, the first chapter observes approaches for the placement and integration of existing library services into the above-described selected environments.

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[30] cp. ASADI 2004, p.7

2.1 Virtual Institutional Environments

2.1.1 Course Management Systems

Course Management Systems, also referred to as Virtual Learning Environments (VLEs), are rapidly becoming an established piece of institutional infrastructure for the support of learning and teaching, and nowadays the majority of educational institutions have a VLE in place.

This account solutions that make it possible to establish an infrastructure for e-learning and web-based teaching, used exclusive or supportive as a combination between physical and virtual courses, referred to as blended learning.

Recent research shows that there has been a significant increase in the uptake of VLEs by institutions in the last four years, and the most prominent in use at educations of further and higher education by the year 2005 had been WebCT, Moodle and Blackboard.[31] While functionality and technical frameworks of these specific VLEs may differ, they all provide a set of common features for the creation of virtual classrooms, utilizing communication tools (i.e. email, real time chat, discussion forums), productivity tools (i.e. searching within course, calendar), student involvement tools (i.e. student portfolios, group work, self-assessment), course delivery tools (student tracking, online grading) and administrative tools for creating and controlling access to courses.

[31] cp. BRITAIN 2003, p.5

There is a lot of interest in developing linkages between library and course management systems, and the Joint Information Systems Committee is funding several projects that examine practical approaches to make library services and resources available within these selected environments.[32] Whereas many projects are focusing on solutions that may act as direct links back to the academic library homepage, referred to as shallow integration, the project for Dynamically Enhancing VLEs with Information from the Library (DEVIL) is exploring the integration of library resources into course management systems at a deeper level, presenting the entire search process within the VLE framework.[33]

Partnering in the DEVIL project, library services of the Edinburgh University Library have been made available within WebCT, the course management system in use at the university. In order to present the offered library services within the VLE, a brokerage system had been developed to provide the technical infrastructure for interaction between the library and course management system. This brokerage system, referred to as DEVIL agent, allows to cross-search and retrieve library assets via the Z39.50 protocol, a search-and-retrieval protocol that has a long history in library automation, used as a global standard to query bibliographic systems in MARC format.[34]

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[32] cp. MCLEAN 2004, p.6

[33] cp. CREE 2005, p.5

[34] Management and development of this protocol is carried out by the Library of Congress, which serves as Maintenance Agency since 1990

As the library catalog at the Edinburgh University Library is accessible in that manner, the DEVIL agent can match user queries to the indexes of the library catalog. Other existing Z39.50 gateways can also be considered search targets for the DEVIL agent, as for example open access collections such as Intute are compatible with the protocol.[35]

The DEVIL agent can be embedded in form of a generic web utility, providing a simple text field for the user query, a submit button, and a standard dropdown menu to choose from individual repositories. Currently users that are logged on to the course management system at the University of Edinburgh can search the library catalog by the four search modes title, author, subject or any (all available MARC fields). Results are displayed within a dedicated frame, allowing users to perceive search results without having to leave the VLE. As more than 70% of students are likely or very likely to make use of OPACS and bibliographic databases when presented within course management systems, the DEVIL project proves to be a profound way of providing new users with existing services offered at institutional libraries.[36]

[35] Intute is an online service providing access to internet resources for education and research, created by a network of UK universities and partners. According to the homepage, subject specialists evaluate selected websites and write high quality descriptions of the resources. Currently Intute contains over 116.000 records.

[36] cp. CREE 2005, p.10

2.1.2 Campus Portals

Many institutions are examining the potentials of university or campus portals, replacing numerous individual websites (i.e. staff websites, department websites, university homepage, intranet) by drawing together a range of administrative and university information for convenient central access.[37] According to a survey examining the relevance of portals in higher education conducted by the consulting agency Accenture in 2003, virtually all questioned academic institutions in the United States, United Kingdom, Canada, Italy, Singapore and Australia are either planning, developing or have already implemented a campus portal.[38] While the functionality and design of specific campus portals may differ, they all offer at least a minimum of common features in order to reflect the environment that students and faculty experience on a traditional campus.

For example, portal solutions such as ANGEL and Campus Pipeline provide tools for communication (i.e. e-mail, chat, forum), personalization (i.e. customization of layout and content displayed), and authorization (typically allowing access and usage of available features within the campus portal from a single identification process involved), as well as integration of course management systems and further custom contents.

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[37] cp. DEMPSEY 2003, p.5

[38] cp. ENGLERT 2003, p.12

Being aware of the advantages of presenting students with existing library services from the campus portal, the institutional library at Plymouth State College has made its services available within the "myPlymouth" campus portal, a solution based on Campus Pipeline. All students enrolled at the college are automatically assigned to the portal, and once users are logged on they have access to a number of resources displayed in several tabs without the need for further authentication, supporting the integrity of a single-sign on system.[39]

Besides the sheer placement of resources and services, a major goal of the library had been the integration of offered services whilst overcoming identification issues for users that try to access licensed content from inside this campus portal. In a first step information on and services available at the institutional library have been made available in an additional tab. From here users can conduct a search within the OPAC or click-through to make use of the array of electronic resources provided. While the results from the OPAC search are displayed within the campus portal and the dedicated library tab, typically students that wish to make use of electronic resources are redirected to the search interfaces of the individual information providers. When logged on to the portal from within the campus computer network, access to these resources is established via IP address authorization, whereas remote access for user that have logged-on to "myPlymouth" from personal computers outside this computer network (i.e. from private homes) had not been available.

[39] cp. PLYMOUTH 2005, p.3

Therefore, in a second step a self-developed identification solution, referred to as WAM, had been established by mid of 2003, capable of redirecting off-campus users to licensed library resources based on interaction between the various web servers hosting the ILS, campus portal and college administration software.

Measuring and comparing the average usage, it can be seen that solemnly access to services from inside the campus computer network did not have much impact, and it is assumed that students continued to make use of the full range of library services directly from the library homepage. Instead, after the WAM solution had been implemented and portal users could access licensed resources from outside the local campus network, around five times as much users are counted, demonstrating the positive effect on usage and perception of existing library services when presented within university and campus portals.[40]

[40] cp. PLYMOUTH 2003

2.2 Commercial Search Engines

2.2.1 Catering to Web Crawlers

One option to present library services within commercial search engines is by actively catering metadata on library collections to web crawlers. This approach is not implying cooperation with the companies operating the search engines, but actively engaging into some form of Search Engine Optimization or Search Engine Marketing, in order to position homepages among prominent results of CSEs.

In many cases only the library websites publicly available on the open web can be harvested by web crawlers, revealing only information on the institution itself, such as opening hours, locations and perhaps brief descriptions of the services offered, and CSEs and the related web crawlers can only aggregate very little information on the services and resources that an institutional library is offering.

Therefore chances of appearing among the first results of SERPs seems low when queries do not contain relevant and exact keywords related to the academic library or university. In order to appear among SERPs that resulted from queries in a much broader context, it seems possible to make use of the rich metadata stored inside MARC records as well as more detailed descriptions of the material contained in electronic resources.

The following demonstrates how exposing metadata on library collections to web crawlers can have an impact on the usage and awareness of library services, and how this is achieved by the Vanderbilt Television News Archive (VTNA), formerly a "victim of the invisible web".[41]

Similar to academic libraries, the VTNA is providing eligible users with access to a collection of U.S. news broadcasts consisting of over 800,000 records, accessible via a search interface on the company's homepage. Most of the records are described by abstracts giving the title of an individual news story, description of the event, time and date stamps, as well as the names of the people involved.

Analysis of the server log and related HTTP referrer have shown that most people redirected via the search engine Google typed in queries alike "television news search", "Vanderbilt University", "TV archive", "television news" or "TV news".

Therefore the VTNA created a single static HTML page for each record inside the database, mentioning the title of a record in the HTML title tag, complete abstract, information about the institution and a prominent hyperlink in order to provide potential users with an easy to follow path to the actual homepage and the dedicated search interface. Additionally, all static HTML pages have been linked to another, in order to guide the web crawlers to each of the individual pages. These linked websites are then placed under a sub domain of the VTNA homepage, publicly accessible from the World Wide Web.

[41] cp. MARSHALL 2006, p.1

At this point the former invisible information contained inside the VTNA database had been made accessible to web crawlers, and it was possible to submit the URLs of the static HTML pages to the search engines of choice.

After making use of the submission programs that the individual search engines provide, a new analysis of the server log demonstrates that exposing this metadata has helped to broaden the spectrum of queries that lead to VTNA resources. Users are now redirected via Google in a much broader context, not only through exact keywords related to the institution, but for example from queries alike "Dubai ruler death", "titanic sinking", "Hughes inheritance", "gun violence Boston" and through queries that contain the names of news anchors and celebrities.[42]

Similar observations indicate that a large number of users find materials contained within the NASA Digital Library through CSEs instead of accessing the collections through the dedicated search interface, as abstracts and reports are "indexable" by web crawlers.

As around 50% of students are making use of library sources when displayed in SERPs of commercial search engines, and libraries do have a lot of metadata on collections and resources at hand, the potential of leading users back to library services from CSEs may increase noticeable by exposing this metadata to web crawlers. [43]

[42] cp. MARSHALL 2006, p.3

[43] cp. PAN 2005, p.3

2.1.2 Cooperating with Search Engines

As the majority of users begin a search at commercial search engines, a simple button built into popular search engines could lead new users to library services.[44] This approach implies large-scale cooperation between individual libraries, ILS-vendors and the companies operating the targeted commercial search engines, as technical solutions have to be developed and implemented in order to attach this button to relevant results.

In the year 2003, the ILS vendor OCLC introduced the WorldCat Project in cooperation with its customers and several partners operating search engines and relevant websites, including Amazon, Google Scholar and Windows Live Academic. When a user performs a search at a WorldCat partner site, keywords are not only matched against the index aggregated with the help of web crawlers, but also to an index describing the collections of libraries which are participating in this project.

Depending on the algorithm of the search engine, matching results are displayed on the SERPs, prefaced by a hyperlink with the phrase "Find in a Library". By activating this hyperlink, users are redirected to the WorldCat search interface and can enter geographic information enabling the identification of appropriate local libraries by postal code, state, province or country.

[44] cp. SCHNEIDER 2006-3, p.2

In contrast to the numerous local library catalogs that are created independently in the past, the majority of records inside the WorldCat catalog are created and maintained collectively by the participating libraries, and each record is created only once in a central database which is managed, maintained and hosted by OCLC. From here participators can add or edit bibliographic information and indicate local library holdings. Currently the WorldCat project counts over 81 million bibliographic records from 57,000 participating libraries in 112 countries and almost as many languages in its database.[45]

Whereas libraries that are using a cataloging service of OCLC have their local holdings listed in the database by default, further options in order to participate in the project are based on the product line of the ILS vendor, like for example "Cat Express", a subscription-based service with pricing depending on the number of records to be displayed. Besides displaying bibliographic records of materials held at local libraries, participators can establish identification solutions that make it possible for users with a valid library membership to access licensed content from a broad selection of information providers via the so-called "FirstSearch" service, the aggregator offered by OCLC. Further, the project supports linking to licensed resources via an OpenURL link resolver, allowing context-sensitive linking between a bibliographic database and the electronic full text from an information provider, taking into account which material users are authorized to access by subscription or license agreement.[46]

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[45] cp. http://worldcat.com, last visited on the 7th February 2007

[46] cp. http://lu.com/odlis, last visited on the 2nd of March 2007

Usage statistics from September of 2004 counted three million clicks to WorldCat records from Google and Yahoo, and according to data available from OCLC, 83% of users arriving at the WorldCat search interface from Google and Yahoo are ending up at a local online library catalog, 9% at a library information page, and 7% percent at licensed electronic resources (4% via "First Search" and 3% via OpenURL link resolvers).[47]

These figures confirm that the cooperation with commercial search engines provides a profound approach for generating new users for existing library services. Still, critical aspects remain, as for example participation in the project is based on fees and subscriptions, perhaps implying the library board to drawbacks on other financial spending, and it stays unclear how exactly targeted CSEs and websites treat the WorldCat index in their algorithms.

[47] cp. QUNIT 2004, p.2

3 Existing Users, New Uses - Enrichment and Enhancement of the Search Experience

For the last ten years online searching has become simpler and more effective everywhere, except for library services, and in 2004 Holly Yu and Margo Young noted that in spite of many studies and articles, several of the original ideas about improving user success in searching library resources have yet to be implemented, but ironically are now found at commercial search engines.[48]

Students' use of CSEs now influences their perception of other web-mediated information retrieval systems, and the impressions that they carry from using the open web are matched against appearance and performance of library services. Studies have shown that users believe search engines to be easy to use, providing immediate access to information, whereas interaction with web-mediated library services seems disappointing and frustrating, as students are encountering many failed searches, confusing search and retrieval methods and poorly organized search result sets.

[48] cp. YU 2004, p.1

As it seems crucial to learn lessons from commercial search engines that dominate student's use, adoptions should be implemented into library systems where possible and meaningful, providing a maximum of orientation towards information customers which are addressing library services with high expectations driven by the former.[49]

For one part, this can mean to offer enhanced functionality and features for users that interact with library search interfaces and are about to submit a search query. On the other hand it feels equally necessary to draw attention onto enriched displaying of search results, because even as it is well accepted throughout librarianship that effective displaying of search results helps finding patrons what they are looking for, currently results in many OPACs are only sorted after the date they had been added – "last in- first out".[50]

Based on this, the second chapter observes approaches for enrichment and enhancement of the search experience by adopting selected features found on CSEs.

[49] cp. GRIFFITHS 2005, p.9

[50] cp. SCHNEIDER 2006-1, p.1

3.1 Enhancing the Search Process

3.1.1 Federated Search

Basically all commercial search engines today offer federated search mechanism, as they are presenting a user with a single search application from which to search over the multiple resources aggregated inside the search engine's index. Accustomed to this functionality, a certain percentage of users are assumingly not making use of the multiple services academic libraries are offering, expecting to enter a query to one search interface, most likely the OPAC, and retrieve information pulled together from across all available collections and resources.

But as mentioned in the beginning, at the moment there exist several fragmented "information silos" on the library landscape, each with different tools for identifying and obtaining material, and OPACs contain only a portion of the material owned and offered by an institutional library.

This situation seems extremely confusing to most users, and investigations carried out by the project for Evaluation of Distributed National Electronic Resources indicate that the majority of questioned students do not understand the difference between the OPAC and further electronic resources offered by academic libraries.[51]

[51] cp. MACAULAY 2006, p.4 and GRIFFITHS 2005, p.6

While this problem is targeted on the part of librarianship by user training and tutorials, further surveys conducted reveal that more than 80% of participants enrolled at educational institutions of further and higher education had considered to look for e-journals and other information resources inappropriate for a library catalog search, but had been using the OPAC search interface to do so.[52] Even as electronic resources are categorized after individual subjects and explained with brief descriptions, students find it difficult to locate information and resources, and are missing orientation and lucidity.[53] They do not expect that one brand, in this case the institutional library, does not offer all services under one roof, and neither understand the complexity of underlying systems nor wish to have to be guided or read tutorials before making effective use of the services provided. In fact, it should be possible to design search applications that can be used without any training necessary, and if services cannot be used without training, it is the services that need to be fixed – not the patrons.[54] As users are welcoming the ability to enter a search term into a single interface and retrieve results pulled together from all available resources, it is advised to simplify the complexity for existing users interacting with library services by presenting only one central search application from where to search the entirety of collections that an institutional library has to offer.

[52] cp. YU 2004, p.9

[53] cp. LAZARUS 2002, p. 8

[54] cp. NEXTSPACE 2006, p.8

This federated search solution, also referred to as metasearch or broadcast search, may allow the library to become the one-stop shop which existing users and potential new users find so attractive, and shall assure that available high-quality resources are considered and not missed out. Additionally, this may also reduce the time needed for searching several resources and eliminate the need to understand and comprehend different GUIs. Analog to CSEs that have shown the power of pre-harvesting metadata, all metadata available on library resources should be pre-harvested and aggregated within a central index, to which search terms are matched, perhaps even including selected resources from the open web.[55]

While this federated search mechanism seem to be a good solution to reduce the complexity of the library information environment from the users point of view, it has to be considered that this might bring up much more results in comparison to searching single information resources one after the other.

[55] cp. ASADI 2004, p.8 and YU 2004, p.9

3.1.2 Query Manipulation

Analysis of transaction logs evaluated over the time period from 2000 to 2002 at the academic library of California State University have been revealing that users make predictable and correctable mistakes when formulating queries. Approximately 30% of all searches result in zero hits, with even higher failure rates when performing subject searches. Several reasons can be found targeting that issue. Firstly, students often use very chaotic, what they themselves term random queries, as they do not know how underlying search mechanism function in detail. Secondly, inadequate formulations occur because students are not familiar with the Library of Congress Subject Headings (LCSH), and generally do not look up adequate search terms in thesauri before conducting a search.

Additional surveys conducted by the Danish Centre for Education and Research in 2003 show that miss-spellings and typographical errors account for over 15% of zero-hits, and often searches fail simply because queries are spelled wrong, not matching underlying indexes.

User-focused systems should offer suggestions, referred to as query manipulation or feedback, and never leave a user alone with failure, facing zero results with no alternative.[56]

Overlooking current CSEs, basically all of them offer some sort of query manipulation, as Google, Yahoo, Ask.com or Windows Live have built-in solutions that are able to analyze entered queries.

[56] cp. BTSF 2005, p.13

If calculating that an alternative spelling might generate more relevant search results and potentially be more appropriate, these terms are presented, prefaced with phrases like "Did you mean", lastly leaving it to the user whether to accept or ignore them. According to the company's homepage, Google's spell check is based on occurrences of words found throughout the world wide web, and is able to suggest common spellings for proper nouns, i.e. names or places, that might not appear in a standard dictionary.[57]

While the former described suggestions are provided after a query is submitted, Alltheweb.com, Answers.com and others are providing their users with feedback while typing the query into the text field, referred to as dynamic feedback. Here suggestions are presented in real time, and as soon as the first letters of a query are typed into the search field, a list appears, commonly assigned with the number of results that will occur if this alternative is indeed chosen, giving the user the chance to see and pick suggested relevant search terms before submitting a query.

As many students and casual researchers of web-mediated library services are likely to submit queries that are not optimal, reaching from inappropriate formulations to sheer typographical errors, user query manipulation mechanism seem to be a good option to support the overall user search experience.

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[57] http://labs.google.com/suggest/faq.html, last visited on the 18th of March 2007

3.2 Enriching Result Pages

3.2.1 Ranking

Numerous studies have demonstrated that the majority of users are not looking through all hits on search result pages, and when it comes to the displaying of search results, certainly one of the most important features found at CSEs seems to be the ability to rank results after relevance.

This is basically done by combining and calculating the frequency of a search term within individual documents or websites, respecting the number of occurrences, positions and field weights. This Term Frequency (TF) is put in relation to the overall sum of documents that can be searched, known as Inverted Document Frequency (IDF). The fewer times a term appears in the entire aggregated index, and the higher the Term Frequency within an individual document, the higher the relevance value and position among search results.

Of course this algorithm is not the only ranking criteria, and CSEs are also taking into account further criteria such as the number of referrals linking to a specific source or document (Page Rank), and even sponsored results. But simply this automatic TF/IDF relevance ranking has proven to be very effective, offering quite adequate results among the first few hits displayed.

Contemporary users are now expecting this feature to be implemented when presented with a list of search results, because they want more than the ability to search multiple resources simultaneous, but receive results in one single list and ranked after relevance, and if not further improved, this is among the must-have features for any information retrieval system in use today.[58]

Libraries do have a lot of metadata on their collections at hand, and therefore ranking algorithms could be driven by quite more than the mere occurrences of search terms, but fed by a wider range of criteria, such as circulation activity, number of holdings or number of placement of materials on class reserve lists, further indicating the popularity and importance of specific individual materials to instructors and students.[59]

Additionally, it is possible to rely on automatic ranking algorithms quite similar to the Page Rank model, based on the principal thought to judge a scientific paper by analyzing how often others cite and mention it.

Here, items and documents that are often quoted in endnotes and references should be assigned with a higher relevance value, as they feel to be more important to the academic community.

Besides automatic ranking of results, libraries can further make use of the potential that lies within human suggestions, also referred to as “best bets”.

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[58] cp. BSTF 2005, p.19

[59] cp. NEXTSPACE 2006, p.12

Professional librarians know quite a lot about the collections and resources owned and offered, and can evaluate search logs and transaction scripts to find out what search terms are the most popular among the users or which queries resulted in zero-hits. Based on this, selected materials that seem to be very relevant for particular queries may be assigned with a high relevance value, forced to rise to the top of a search result page.

As ranking algorithms have shown to be not only very effective, but nowadays an essential feature of any information retrieval system, it seems obvious that some sort of ranking has to be introduced to the then federated library search applications in order to fulfill users expectations and enrich the search experience.

3.2.2 Dynamic Browsing

Search engines such as Clusty.com and Vivisimo.com provide users with dynamic browsing options, presenting logical subsets of matching results. Also referred to as clusters and facets, this allows users to filter the found items and drill-down even further into the remaining results, as they are again dynamically organized and categorized.

While formulating a specific query requires to make up-front decisions on what exactly to enter into a search field, browsing is said to be a quite more natural approach, requiring less effort and knowledge on the part of the user, and as students often need to respect a much broader context of search results and work through larger sets of hits that may all be relevant and important, it seems that only ranking results might not be sufficient.[60]

Targeting those aspects, a project group at the academic library of the University of California developed an innovative search interface with the goal of offering users a GUI that made them feel like "browsing the shelves".

This search interface had been examined and tested among art history students interacting with a database of 40,000 architectural images, known as the Flamenco Test. Metadata describing the images had been manually reorganized into nine facets - People, Locations, Structure Types, Materials, Periods, Styles, View Types, Concepts, and Building Names.[61]

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[60] cp. BSTF 2005, p.14,20

[61] cp. ENGLISH 2002, p.2

Participators of the Flamenco Test could choose whether to make use of a regular text field for executing or refining a search, or of a dynamic browsing option which sorts and categorizes the available images after a faceted classification based on these nine facets. The displaying of search results could be refined by choosing further available facets or withdraw them from the selection to broaden the search again. Observations had been revealing that this dynamic browsing resulted in greater search satisfaction, significantly better success in finding relevant material, better content familiarity, and seems clearly the preferred search option in comparison to entering specific terms and formulating a user query over and over to match the underlying indexes.

Based on this, it is advised to offer users options for dynamic browsing generated on the basis of metadata fields available in MARC and FRBR format - eventually categorized after clusters such as resource, date of publication, language, subject, availability or type of material. In addition, visualization aids based on those facets could improve the user search experience even more, as on search sites like Grokker.com facets are presented not only as text, but are also visualized accordingly.

4 New Users and New Uses – Observing Social Computing and Web 2.0

Overlooking possible approaches for finding new users and new uses, it is advised to think "outside the box", in a more creative and visionary way about the future of library services, and the advent of web 2.0 has led to meaningful impacts that might provide the foundation for approaches that are settled here.[62] Even though the term might suggest something different, it does not refer to a single update or new version of the World Wide Web, and as there exist no authorative definitions at present it is associated different throughout branches and contexts, functioning as a label for multiple developments that are taking place throughout the "online world".

While widespread among software companies, the media industry and individual contributors, criticism is raised targeting it to be just another buzzword, not representing a complete picture. On one side, web 2.0 is described to a great degree by technological aspects that allow for seamless interoperability of applications and services. Others emphasize the architecture of participation, user-empowerment and sociological aspects closely related to social computing.[63]

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[62] cp. BATES 2003, p.12

[63] cp. OREILLY 2005, p.2

In the view of Tim O´Reilly, who actually coined the term in 2004, web 2.0 has to be regarded as a concept with no clear boundaries, but rather a gravitational core.
Therefore the following mind map is trying to illustrate just how far-reaching and varying the associations, viewpoints and definitions are.

Overlooking the above illustrated, the web 2.0 concept certainly offers strategies and starting points for academic libraries and the services which they are offering, because in order to reach out for new users on a large scale, interoperability seems to be the key measure, and making use of standard web protocols that allow applications to communicate across platforms might result in a more seamless and satisfying user experience.[64]

[64] cp. DEMPSEY 2003, p.35 and CALHOUN 2006, p.39

Additionally, as mentioned in the beginning, user orientation has to play a substantial role for any product and service offered to contemporary information customers, and providing options for participation is transforming former passive consumers to more active and equal "prosumers".
Based on this, the third chapter observes selected technologies, mentalities and applications commonly associated with the web 2.0 concept that are carrying the potential for generating new users and new uses for web-mediated library services.

4.1 Engaging in Social Networks

Students increasingly participate in virtual social networks for research, education and leisure, ranging from special interest communities to photo sharing services and platforms providing users with a web space to present themselves.

Prominent examples of such websites, which have gained high attention throughout the last few month, are Myspace.com, a social network built around music and similar interests, currently counting over 100 million user profiles, and Flickr.com, offering the possibility to store, search, sort and share photos online.[65]

Myspace.com and other social network sites (SNS) grow at a rapid pace, and one reason for social networks becoming so popular certainly lies within the fact that they create vibrant communities of users designating their relationship to other users of the same interest, and gathering and matching individuals with the same background.[66]

As Calhoun puts it, the task of libraries of today seems to switch users in their communities from where they find things to library collections and services, and in fact much of the role of academic libraries throughout history has been to function as a social gathering place.

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[65] cp. BTSF 2005, p.8 and MORATH 2006, p13

[66] cp. SPOOL 2005, p.3

For that, it does not require much imagination to begin seeing a library as a social network which may be transformed to a virtual social network by developing SNS in the context of academic libraries, dedicated to their user groups and built around the services and uses.[67]

But until those library-managed SNS are developed and deployed at individual academic libraries and their organizational institutions, at current it might be adequate to reach out to new users by engaging into already existing networks and related websites.

The social networking site Librarything.com gathers a virtual community dedicated and based entirely around books and print materials. Participants can create individual accounts enabling them to catalog the books they own or have read, and in a second step present and recommend them to other users as „private libraries", who can in turn comment and rate the individual items presented.[68] This SNS is currently counting over twelve million titles that more than 100,000 individual participators have indicated as owned or read, supporting the exchange of owned material, discussion and conversation, as well as becoming aware of new titles. [69]

Two large booksellers can already be found on Librarything.com, leading potentially thousands of members to their supply, and it feels apparent that academic libraries could recommend their offered resources and services to new users from here in a similar style.

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[67] cp. CALHOUN 2006, p.37 and MANESS 2006, p.8

[68] cp. MANESS 2006, p.7,8

[69] cp. http://www.Librarything.com, last visited on the 20th of April 2007

This is warmly welcome by the developers of Librarything.com, as they have already begun to explore possible relationships with libraries to offer non-commercially motivated recommendations and other social data. Professional librarians have already established the largest member group on Librarything.com, titled „Librarians who LibraryThing", currently counting almost 1.400 participators.

Thus, Librarything.com could be well predestinated for institutional libraries to represent their services and holdings, and actively engaging into social networks might change the virtual library environment into a dynamic virtual community, carrying potentials for the integration of library collections and services into a larger scenario of information seeking.[70]

[70] cp. MARKEY 2007, p.8

4.2 Allowing for User-generated Metadata

As described in the beginning, metadata sets describing individual resources are created according to strict standards that are set out in cataloging rules librarianship has agreed on, remaining a skilled process normally undertaken by highly trained information professionals and professional indexing librarians.

In contrast, Social Bookmarking Services (SBS) and collaborative tagging applications like Del.icio.us allow any user to create metadata and keywords to describe items and content elements found throughout the World Wide Web, referred to as tagging.

By this, individual users can add freely chosen descriptions that are making sense to them, seen as being essentially Web 2.0, because this allows users to add and edit metadata, the information describing information.[71]

As other participants may have described content elements with the same or similar term(s), they can also search and inspect the tags that others have assigned, and get a quick measure of the importance of an individual item or website by overlooking how many different people are describing it with specific selected terms. This is commonly done by visualizing the most popular tags by size, according to the total count they are used, known as tag clouds.

[71] cp. MORATH 2006, p.13 and MANESS 2006, p.8

Besides Del.icio.us there exist further more specialized SBS, as for example Connotea.org, providing members with a dedicated space for user-generated descriptions of scientific papers and further academic material, retrieving information of interest to them as well as records tagged by others that match their interests. As explained earlier, students and casual researchers often encounter zero hits with even higher failure rates when performing subject searches, and it has been stated that LCSH are not useful to casual researchers and many searches are not formulated optimal. The example of the U.S. Library of Congress's Subject Heading "cookery," which no English speaker would use when referring to "cookbooks" illustrates this problem.

Allowing for users to assign individual metadata by describing materials with their own use of language could turn the useless "cookery" to the quite more useful "cookbooks".[72]

Therefore, in addition to scholarly commentary and other forms of participation, libraries should welcome the submission of user-generated metadata, and it should be made possible for users to freely attach tags to records and material found through web-mediated library services and the related search interfaces.

Observing the effects of such user-generated metadata, the institutional library at Pennsylvania University has recently started to offer this possibility by enabling the creation of so-called „PennTags".

[72] cp. MANESS 2006, p.8

Here students can individually organize materials and records, giving them quick and personalized access to the resources they have come across, and thereby also participating in the cataloging process.

Further, as librarians are used and trained for describing owned and offered collections, even the Library Journal is recommending its readers to engage into Social Bookmarking Services such as Del.icio.us and Connotea.org, in order to attract new users from these new environments.[73] This may be a way to let communities of users discover and retrieve records and information of interest, carrying the potential of generate new users and new uses for web-mediated library services, and seems worth to follow. Naturally, it has to be pointed out that those tags should not be used as an exclusive search function, but in combination with the traditional search modes and algorithms.

[73] cp. BSTF 2005, p.9 and DANOWSKI 2006, p.2

4.3 Providing RSS Feeds

RSS is an abbreviation for Really Simple Syndication, often also referred to as Rich Site Summary or RDF Site Summary, and has gained increasing importance throughout the last few years, by many described as *the* internet technology of the new millennium.[74] Based on the XML computer language, a so called RSS feed consists of individual XML tags that can be used to structure and exchange data and information via a standard machine readable protocol, and as XML is not restricted to text, those feeds can be used to distribute further multimedial content and information.

A large number of providers are offering their audiences via RSS feeds another possibility to receive information and content elements. In order to read one or more RSS feeds, end users have to make use of a so-called web feed reader. These applications are able to parse and combine the information from various sources, and by now almost every commercial web browser is capable of supporting this protocol.

Certainly one practical advantage lies in the fact, that by subscribing to a feed, users are automatically provided with content elements that can be found on websites, without the need to point their web browsers to the individual sources of interest (i.e. ULRs), but receiving notifications and updates within an application as soon as they occur.

[74] cp. OBST 2006, p.1

RSS was designed to empower user to view content when it is wanted, not on the behest of the information provider, and this concept of pushing information out to users instead of waiting for them to come and pull is turning around traditional information distribution models.[75] Further, as the XML standard makes it easy for developers to extract and integrate data from other sources into their own, RSS feeds from various sources can be combined and integrated into third-party applications, making it possible to disseminate content in many environments, i.e. as news tickers or in shape of the currently popular „gadgets" on the desktops of operating systems.[76]

Several individual academic libraries have begun to make use of this relatively new information exchange standard, and offer RSS feeds to promote and extend their services wherever possible.

For example, the academic libraries at Northwestern University, Georgia State University and the University of Münster offer feeds to alert subscribers to current activities and news, and a few are also alerting subscribers for recently acquired material. As soon as this new material is available, for example once a new issue of an e-journal is published, a link could be provided as well, redirecting eligible users to the related resource - or, for users not permitted access to licensed content, at least to the „door" of the information provider.[77]

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[75] cp. OREILLY 2005, p.11

[76] cp. MORATH 2006, p.14

[77] cp. MACAULAY 2006, p.8

This is done by the aggregator Ingenta, which is providing RSS feeds for each of its more than 28.000 e-journals, attached with a link that can be followed by users that have the rights to access licensed resources. In a similar way the information provider BioMed Central makes use of this technology, offering RSS feeds that are including hyperlinks which are directing users to the available material stored within its open access collection.

In addition, there are other practical ways in which institutional libraries can make use of RSS feeds, as done by the A&I service PubMed, a service of the U.S. National Library of Medicine that includes over 16 million citations from MEDLINE and other life science journals. Here, after conducting a search by typing one or more search terms, users are provided with the generated results in form of a RSS feed, and as soon as new articles and journals matching the former search query are available, users are pushed with this new results automatically.

As feeds can be distributed through several information channels, are available on the behalf of the users, and can easily be recombined and integrated within other applications and into almost any other environment, it feels that RSS and the related technologies prove to be very meaningful in order to disseminate information and resources on individual academic libraries as widely as possible, leading to new users and new uses for the services available at individual institutional libraries.[78]

[78] cp. MILLER 2006, p.9

5 Conclusion

As demonstrated throughout this paper, there exist options and actions to revitalize web-mediated library services provided for the purpose of discovery and delivery of bibliographic data, scholarly material and scientific information, and strategies and approaches can indeed be found by focusing on users and uses.

Still, it has to be mentioned that many of these strategies and approaches cannot be realized by librarianship alone, but need the support of their organizational institutions and especially ILS vendors, which are supplying academic libraries with dedicated solutions for library automation.

As ILS vendors need to focus on long-term developments and have to serve a quite more conservative and traditional market in comparison to the open web and commercial search engines, it is only natural that the products offered to their customers did not develop in the same speed as the ones found on the open web. But by now it is advised to rethink the services and software solutions, and outlined features and approaches should be adopted by individual academic libraries and ILS vendors wherever possible.

To end with, it feels necessary to note that no profession can survive when throwing overboard its principles and key competences in response to every shift in the zeitgeist, while at the same time it might be equally disastrous when a profession fails to acknowledge adoption of fundamental changes too late, without overlooking the market and customers it serves.[79]

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[79] cp. NEXTSPACE 2006, p.8

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Hiermit versichere ich, dass ich die benutzten Hilfsmittel im Literaturverzeichnis vollständig angegeben und die Arbeit ohne fremde Hilfe selbständig verfasst habe.

S. Salama
Würzburg, im April 2007