At a Tipping Point: U.S. Academic Libraries and the Change Agents in Their Environment

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ABSTRACT: Powerful forces are competing for the next-generation knowledge organization system in order to shape the future of academic libraries. The purpose of the paper is to examine these forces and see how they have been influencing the ways in which information-seekers in U.S. colleges and universities will be gathering information on that system of tomorrow. Moreover, this paper explores the scholarship in the literature to gain insight on how the historical development of the country outside academic libraries has exerted influences on the direction of academic libraries in the 21st century. By stepping back for a broader perspective, areas where libraries see themselves challenged can also be opportunities to mold the existing system into one for the future.

Technological developments have barged into social consciousness not too long ago with a dizzying array of inventions: in 1994, the Netscape browser and the first search engines; in 1996, the Palm Pilot; in 1997, Internet Explorer from Microsoft; in 1998-9, Google; in 2001, Wikipedia; during 2000-5, iPOD; during 2004-5, Google Print (which became Google Books); and in 2005, YouTube (Goetsch, 2008, p. 161). The speed with which new technologies are introduced to society can be mind-numbing. While these technologies have wrought changes in people's lives, they have felt little perturbation over the direction being actively charted.

Powerful forces are competing for the next-generation knowledge organization system in order to shape the future of academic libraries. The purpose of the paper is to examine these forces and see how they have been influencing the ways in which information-seekers, particularly those in U.S. colleges and universities, will be gathering information on that system of tomorrow. Moreover, this paper explores the scholarship in the literature to gain insight on how the historical development of the country outside academic libraries has exerted influences on the direction of academic libraries in the 21st century.

The paper is divided into three main sections. The focus of the first section is on the changing norms in the management of the college or university campus and their implications for academic libraries still under traditional setting. In the second section, the spotlight goes to the academic publishing industry and the ambitions of the major information service suppliers to compete with and even supplant the role of academic libraries in providing service to patrons. The third section centers on the emergence of social web technologies, with Google as the representative, and the paradigm shift brought to academic research vis-à-vis the research process, reshaping the library user's expectations and preferences.

If strong winds are making changes to traditional ways, the struggles of academic libraries at present in the United States need to be understood through an examination of the different contexts in which they exist. By stepping back for a broader perspective, areas where the libraries see themselves challenged just may turn out to be opportunities to help them adapt into the system for tomorrow's colleges and universities.

I. Academic Libraries and Higher Education

The plight of academic libraries would be less convincing without taking into account the multifaceted nature of their relationship with the larger community, that is, their host or parent institutions.

In this section, three aspects of higher education in relation to the development of academic libraries in the United States are discussed: 1) how changes in fiscal management – from government responsibility to institutional privatization – have caused campus departmental units, lincluding ibraries, to remodel themselves toward self-sustainability; 2) how the trend has counteracted traditional library philosophy; and 3) how academic libraries then have sought to prescribe themselves to a new set of norms.

Eells (2004), a subject librarian, described the reality in a growing number of academic libraries that "We are now effectively moving from a collection model centered around each institution's unique research population and information needs to a model driven primarily by economic considerations" (p. 34). Her observation portrays the state of finance in U.S. higher education, which can be summarized as a steady decline of public funding while juggling with the "demands for greater access, shifting student demographics, expanding university boundaries, and the need for remedial education" (Nemetz & Cameron, 2006, p. 41).

Seaman (2005) presented a case study of the University of Colorado-Boulder with ever-increasing operational costs alongside dwindling state allocations. He explained that state and local government contributions to higher education in general had been declining since 1970s, from an average of 55% down to below 43% in 2003 (p. 306). Seaman went on to observe that "distinct trends were emerging from bellwether universities pertaining to restructuring of enrollment and tuition, self-sufficiency of departments, changes in fundraising strategies, and perhaps most importantly, institutional autonomy from state regulation" (p. 306).

His position is reinforced by Stoffle, Leeder, and Sykes-Casavant (2008), who summarized the effects of the financial crunch on academic libraries: "Basically, our costs are increasing faster than any other sector of the higher education community, and our institutions, especially public ones, are receiving fewer funds or at least less new money than the yearly increased costs of the entire enterprise" (p. 4). The relationship of rising costs to the historical development that has escalated into the current crisis must be understood first.

1. The Concept of Quality in Higher Education

In an extensive study by Nemetz and Cameron (2006), the cost and return of college education were analyzed in real dollars. They found that 1) despite somewhat of a decline since 1969, in every year between 1949 and 1994, the median income of a college graduate remained significantly higher than that of a high school graduate or dropout; that 2) the motivation for a better livelihood fueled the desire of the population to attain higher education in this period; and that 3) beginning from 1976 all the way up to 1994, the demand for college drove up tuition costs at a rate significantly higher than that of actual income compensation for the college graduate.

Additional statistics on the growth of postsecondary institutions were provided by Finn and Manno (1996). Before World War II, there were 1,700 institutions, enrolling 1.5 million students, employing 147,000 faculty members, and spending $675 million, which came to about $450 per student per year. Bn 1960, the number of institutions has grown to 2,000. By 1980, the number has grown to 3,150. At the time of their study, there were nearly 3,700 colleges and universities, enrolling 14.4 million people and employing 833,000 faculty members. Higher Education in America became a $213 billion industry (Finn and Manno, 1996). To put in perspective the growth of colleges and college enrollments in this period, Nemetz and Cameron (2006) cited earlier studies by Arimoto (1997) and Zemsky (1998), who dubbed this "societal norm" or "universal right" as the "massification" movement (p. 39).

The flowering of postsecondary institutions has made possible the fulfillment of a basic need of the populace. Regional colleges went national, community colleges spread, and dozens of new campuses sprung up wherever there were corporate investments and high-tech jobs (Finn and Manno, 1996). Thus, the stage was set for the evolution of higher education into mass education, by way of providing an "extension of high school studies" (Nemetz and Cameron, 2006, p. 42).

Redding (2005) condensed the underlying issues into a core question, "[A]re universities meant to be for the best and brightest, or are they for the masses?" (p. 410). Evidence instead pointed to a new perception of quality education – as a commodity just passing off the expectations of the average customer. Redding used the analogy that "like companies that offer that cheap but wonderfully reliable little car that fits the bill, many universities must now reinvent themselves to produce not only the elite high-flyers, but also good solid graduates, and do so with quality in mind" (p. 410).

2. The Cost of Quality

Having absorbed more students, institutions were pressured to provide services and facilities to meet student expectations, which means that colleges and universities have to tie up all the loose ends of their budgets. However, as Nemetz and Cameron (2006) pointed out, while more people became college graduates, many of them also realized that the college costs did not materialize into expected rewards, consequently creating a lot of doubt for their investments.

A growing number began to feel that college education should be a a luxury good rather than a life necessity. According to Seaman (2005), "as public opinion shifted toward higher education

being a private gain, states have steadily withdrawn financial support, leaving colleges and universities to rely on increased tuition and to find savings through greater efficiencies" (p. 306). This was especially hard-hitting for colleges and universities built on the mantra of the last fifty years believing in public support for the massification of higher education (Meyer, 1997, p. 292).

As government funding proved insufficient to cover spiraling operational costs, the drive toward privitization became the obvious strategy for the sustainability of the campus. Boss and Schmidt (2007) observed the surge of interest in business administration: "A phenomenon of the past two decades has been that management innovations in the business world have permeated the human services world in the nonprofit, for profit, and governmental sectors alike" (p. 123). Redding (2005) made similar observations that "many bemoaned the commercialization of universities, where management has been openly applying business vocabulary to education, where programs are products that are client-centered and market-driven" (p. 410), as "university systems undergo a simplification of procedures, a process that many industries went through in the 1980s when early attempts at voluminous management manuals gave way to streamlined and efficient documents" (p. 414).

The management of higher education under this new model could be described as one "composed of a host of institutions that operate largely independently and that behave like profit seekers operating in a competitive environment" (Meyer, 1997, p. 292). One example is a case study of the University of Colorado at Boulder, with its decision to increase fundraising, enrollment, and tuition altogether. Seaman (2005) elaborated on the school's strategy:

> [T]his shift indicated the recognition that state funding would never return, that the campus would be reliant on tuition income, that it was advantageous to encourage departments with potential for enrollment growth, and that development efforts should focus on those departments offering immediate returns (p. 306).

For academic libraries, the economic pressures of their host or parent institutions have directly translated into an atmosphere of "decreasing or flat institutional funding for their acquisitions, inflating costs for continuations, and generally high costs for a burgeoning array of new electronic resources" (D. Anderson, 2006, p. 123). Like their host or parent institutions, academic libraries were driven to abandon old practices for the sanctity of the business model.

3. Roots of the Academic Library System

The academic library, according to the tradition, was regarded as more than the buildings housing the institutional archives and collections. It was a symbol for the extent of knowledge on campus. After World War II, academic research in the United States was broadened voluminously beyond the Western canon and classical sciences to cover all areas of the world. Growing a university library's collections became analogous to creating institutional capital, as the collection size became a kind of measuring stick for an institution's own ranking among competitors of the region (Branin, Groen, & Thorin, 2000, p. 24).

Kaufman (2007) had this glowing description: "Libraries have long been represented by tangible symbols: the jewel in the university's crown, the heart of the university, the campus's treasure. These images are remarkably similar from campus to campus" (p. 8). To extend the reputation of a college or university, give it more of an edge against the many opening up in the period, and attract the promising students and faculty who could then elevate its status – it became necessary for academic libraries to center their efforts and activities in acquiring and maintaining great collections. Hazen (2000) elaborated that "For libraries, the preoccupation (of cold war fears) provoked a newfound emphasis on difficult-to-acquire materials from unexpected corners of the globe." Hitherto committed to uninhibited expansion as principle, American academic libraries worried little about spending since the motto of the day had been, above all, to acquire that rare book or journal (Lewis, 2013, p. 169). Allen and Dickie (2007) found that until the latter two decades of the 20th century, most academic libraries were funded by their institutions in an "incremental" and "haphazard" manner, which was adequate at the time because the library system reflected the way the entire campus was running. "Libraries are somewhat of a microcosm of a university, with large staffing, operational, and program-driven costs" (p. 172). Academic libraries were good at establishing well-meaning service programs, which were oftentimes neglected later on due to the lack of commitment to ensure that they continue meeting institutional needs (Kulp & Rupp-Serrano, 2005, p. 18).

4. For Scholars Only

Another distinctive characteristic of traditional academic libraries is their definition of "library service", brandished with a bit of patron exclusivity. Hazen (2000) described the purpose of academic libraries as wholly for the advancement of their primary users – the scholars. "Bibliographers, library collections, and academic libraries are creatures of the system of scholarly communication. More than anything else, this system defines what libraries need to accomplish and how they can proceed" (p. 823). Essentially, academic libraries and scholarly research often went hand in hand because the improvement of one inevitably led to the betterment of the other. The library system was developed to facilitate the research process of scholars, who needed the library's service and support to produce scholarly works as a way to achieve tenure.

Meyer (1997) described the motivation for tenure as the "engine that drives the scholarly process," manifesting in publications that represent the "quality of those faculty" that would determine their "advancement, salaries, and mobility" (p. 296).

The 2004 National Study of Postsecondary Faculty Report (Cataldi, Fahimi, Bradburn, & Zimbler, 2005) provided data on the relationship between faculty rank and the time demand for research in public postsecondary institutions across the country:

- close to 50% of the full-time faculty in these institutions had tenure, with about a quarter on the tenure track and another quarter not on tenure (p. 22);
- part-time faculty in all institutions devoted all their time to teaching (p. 27), while full-time faculty devoted 2/3 of that time to teaching and at least 1/4 on scholarly research (especially those from higher-level institutions) (p. 26);

- the amount of time for research notably differed across disciplines, with those in the natural sciences, engineering, and agriculture requiring between 25% and 32% of the faculty's time (p. 26);
- research was done primarily for publication in peer-reviewed journals, with the faculty in engineering and natural sciences leading those of all other disciplines in the number of refereed publications per year (p. 33).

Heath (2007) completed a case study of the library system at the University of Texas, illuminating the history behind its undergraduate library – an idiosyncratic concept in the days when academic libraries existed solely for the scholar segment. The intention for the library was to keep the traditional system intact while instigating a form of separate-but-equal treatment for the rest of the student body:

> For, as was the case with most libraries at the time, the intellectual storehouse represented by those books was cordoned off behind closed stacks. The closed stacks collections were accessible only to faculty and graduate students. The burgeoning undergraduate population met their class and research assignments by queuing up at the service desk, waiting until their number was called, turning in their call slips, and waiting again for the seemingly interminable process of paging to run its course…The undergraduate library was to be 'a building of their own,' where clueless, swarming undergraduates such as myself were removed from the midst of the 'scholar' (p. 10-11).

5. Libraries for Student Learning

As governmental funding diminshed, academic institutions were compelled to search for additional sources of revenue to maintain operations. On many campuses, increasing student enrollments and tuition rates offered the most effective, short-term solution and quickly became standard practice. As a result, the average U.S. postsecondary institution enrolled 535 more students in 1993 than that in 1974 (Finn & Manno, 1996). Since the pool of students who could afford and were willing to pay high rates was limited, competition for the most profitable candidates got intense between schools in their attempts to outdo each other with unique offerings of campus products and services during recruitment (Meyer, 1997, p. 292). Because educational dollars followed the students, undergraduates as a student body suddenly got unprecedented control and influence in campus construction and planning (Seaman, 2005, p. 308).

For academic libraries long accustomed to viewing scholars as their main users, their necessary step was learning to increase focus on the rest of the community – the student body now making up their customer base. A number of factors soon indicated that students were not impressed, and more importantly, that student needs and expectations were themselves fast changing. Boss and Schmidt (2007) described these new students: "Unlike previous generations who may have been introduced to computers and the Web after they became adults, many students who enter college now have never known a world without personal computers, video games, and the Internet" (p. 119-20). A wave of studies in the library literature took aim to learn the trends, identify different user habits and preferences, and interpret their findings to help libraries understand how to shift

gears (Belefant-Miller & King, 2003; Smith, 2003; King, Tenopir, & Montgomery, 2003; Nicholas, Huntington, & Jamali, 2006; Nicholas, Huntington, & Williams, 2004).

These studies largely allowed academic libraries to learn that technology had become a key component of their users' daily lives. In many colleges and universities, the library administration was giving up the space of their collections for the building of social centers such as the Information or Learning Commons. At the Thompson Library in Ohio State University, for example, changes occurred in recognition of the needs of students, as large-scale weeding initiatives were undertaken to reorganize old collections and separate out the popular, frequently used items from those dusty and long untouched. The space opening up was renovated to create social spots for student learning activities and information technology services (Branin, 2007, p. 40-1). The more difficult task for library administrators, in time, proved to be implementing an organizational restructure suitable for the applications and resources now taking space in the library while minimizing changes to personnel roles and responsibilities.

6. The Politics of Reorganization

While the trend indicated the need to move away from traditional ways of work and organization, it was a different matter to convince library personnel to embrace fundamentally a kind of job flexibility that never had any precedent in U.S. academic libraries. Miller (2000) expressed library personnel's feelings of ambivalence toward changes when required to readjust themselves to new practices:

> Library workers are accustomed to a hierarchical, functional, or specialty-segmented organization that is involved mainly, almost exclusively, in managing on site collections and information services. We may not think we are 'media-bound' or 'culture-bound' but we do find the prospect of a flattened, fluid organization in which teamwork is the rule and information is distributed across international networks in multimedia and hypermedia formats somewhat daunting to contemplate (p. 660).

Even without considering the hesitation of staff as a factor, academic libraries still have other hurdles to overcome in adapting to organizational transformations, reshuffling jobs, and changing responsibilities.

Goetsch (2008) described how the job titles for traditional librarians changed to encompass newer responsibilities. For example: 1) Systems Librarians no longer work in a mainframe but a client-server environment; 2) Reference Librarians become increasingly technologically literate, as information and productivity tools converged on the desktop; 3) Subject Librarians expand their role to include reference, instruction, and liaison duties, while ensuring that new skills sets such as e-resources selection and management are on their knowledge mantel (p. 159). Goetsch realized that "This wondering job title may also suggest that what we mean by public services, technical services, collection development, systems, and other terms we have used to define our organizational structure is breaking apart and changing as these boundaries blur" (p. 165).

Furthermore, despite an updated agenda to meet with user demands and preferences, academic libraries still have to compete with numerous growing institutional needs and expenditures, ranging from information technology services to higher financial aids and student scholarships, coincidentally when most academic institutions are all placing constraints in financial spending (Lewis, 2008, p. 271; Kaufman, 2007, p. 9). The main disadvantage for academic libraries, as a consequence of having applied the business model to higher education, is that they are perceived as a resource-draining public good, compared to the more profitable units on campus (Allen & Dickie, 2007). For those campus units generating a steady stream of revenues, there is desire for accounting independence from the rest of the institution, with separate management of resources such that they function under their own rules and regulations.

Seaman (2005) observed the political scene in play: "On many campuses, for example, continuing education departments are run as auxiliary endeavors that return a percentage of profits to the institution...Because of the high earnings potential of their graduates, some departments can charge more tuition than others" (p. 307). Academic libraries, in this respect, were markedly "heavy investments in physical facilities that cannot measurably demonstrate their contributions to the enterprise" (p. 307).

Due to their reliance on the larger campus, academic libraries, though poised for change they might well be, nevertheless must address the same concerns as the rest of higher education. Nemetz and Cameron (2006) described it as a clash of old and new ways: "The university is a system increasingly at odds with itself, being pulled in multiple directions at the same time its seemingly reluctant faculties seek to stay firmly anchored in the norms upon which their profession is built" (p. 38-9).

II. Scholarly Research and the Commercial Industry

To maintain their status as campus centers for research, academic libraries need to adapt by providing new resources for the next-generation students and researchers. Yet, the responsibility to catch up and modernize is not entirely theirs to control and manage, from within their institutions. Increasingly, it also falls into the hands of major academic publishers and information service vendors, whose operational interests differ from that of academic libraries.

In this section, the threat from commercial outsiders is discussed in two aspects:

1) how the consolidation of a niche market of publishers tipped the balance against libraries by further worsening their finances; and
2) how technological advancements at large publishers and vendors shifted the management of a significant amount of scholarly contents away from academic libraries.

1. Mergers and Acquisitions

In the United States, the post-WWII funding increase for academic research led to spectacular growth and development of scholarly journals, which became the focus of collection development at academic libraries, sometimes running as high as 70-80% of their acquisitions budget (Moghaddam, 2009, p. 150; Walters, 2008, p. 577). STM (science, technology, and

medicine) journals were publishing 140 articles per title on average annually as compared to 45 articles per title a year from social science and humanities journals. Scholarly journals, rather than monographs, are the choice medium for scholars to communicate research results as quickly as possible (Ware & Mabe, 2012, p. 40). The number of scholars was estimated somewhere between 6 and 9 million by mid-2012, generating sufficient research for the 28,100 active, peer-reviewed journals on the market (p. 22). Miller (2000) summarized libraries' predicament: "Publishers have viewed the library as a perpetual source of income whereas the university has seen it as a bottomless pit" (p. 648).

On the surface, the journal publishing market seems diverse with abundant players. However, much of the power and influence is actually concentrated among a select few, the result of a string of consolidations that began more than a decade ago in the industry (Moghaddam, 2009, p. 151). First of all, there are publishing giants, such as Elsevier, Springer, Wiley-Blackwell, and Taylor & Francis, roughly accounting for 35% of the journals on the market. Then, there are the 95% of publishers that publish about 1 or 2 journals each, who were mostly new entrants born on the Web (Ernst, Rolnik, & O'Doherty, 2007, p. 108).

Indeed, back in 1998, Ketcham-Van and Born expressed concerns for this industry trend, which occurred in parallel to two other phenomena at the time: 1) the rapid transition of journal subscriptions from print to electronic/online in academic libraries and 2) the steady rise in subscription prices for the journals. Essentially, technology, in changing users' perception of information and information access, was also driving the entire service industry to go digital and establish themselves in the information age to remain competitive. By the same token, the investment to upgrade technology was also much more costly for the majority of small-sized journal publishers (Moghaddam, 2009, p. 151).

As a strategy for sustainability and growth, those publishers with deeper pockets resort to the takeover of other journals to build large searchable databases with more contents and higher prices (Ernst et al., 2007, p. 109). Their acquisitions also give smaller publishers an option to maintain their editorial boards and focus on content production while being incorporated into a more sophisticated technology network. It is a win-win situation for both the acquirer and the acquiree. So began the chain of corporate shakeups, as large companies purchased smaller ones, and their respective holdings merged into ever larger catalogs of resultant organizations (Courtney, 2006, p. 60). Additionally, there are publishers who have taken advantage of market instability to build up via vertical integrations. One example is the Reed Elsevier Group, whose expansions included "a wide range of indexing and abstracting databases, information management software, online workflow tools, educational and psychological tests, and business services like recruitment sites and exhibitions, in addition to its large output of electronic and print publications" (Burrows, 2006, p. 172). Whether vertical, horizontal, or a combination, the integrations have accelerated the concentration of a valuable commodity – information in the form of scholarly contents – under the control of fewer hands. By 2008, the industry was able to reach near full capacity in delivering journals electronically: 96% for STM journals and 87% for those in arts, humanities, and the social sciences (Ware & Mabe, 2012, p. 24).

When small publishers existed independently, none had control of sufficient journals to upset their chief buyers, the academic libraries, with a demanding contract. The situation was reversed

soon after key publishers gained significant scholarly contents, to the extent that the libraries could not afford these subscriptions on the new terms of license. At the same time, they could not afford to refuse such subscriptions either, because too much was at stake.

There were a few studies tracking price fluctuations over the years to reveal the impact of publishers' increases on subscription rates in real terms. Eells (2004) studied ARL-member libraries from 1986 to 2002, finding and that their serials expenditures increased almost 227% for the period or 7.7% annually on average (p. 38). Walters (2008) included data for 2003 through 2005 and calculated an even higher percent, 302%, as compared to Eells's (p. 577). Another study put the cost incease closer to an annual 10% for the last three decades (1975-2005), which came to "6 times the rate of general inflation and 2½ times the rate of increase of cost of health care" (Lewis, 2008, p. 271).

In response, academic libraries had little choice but to implement massive journal cancellations to stay within budget (Wolverton & Bucknall, 2008, p. 470). Survey studies revealed that about 85% of libraries canceling their print subscriptions when the electronic version became available (Bullis & Smith, 2011, p. 208). Walters (2008) observed the futility of libraries' actions and opined that "the more libraries spend on journals, the greater the number of journal cancellations that will be required in the future" (p. 578). Meanwhile, exacerbated by economic downturns across campus and country, many academic libraries were relying ever more on these commercial publishers for electronic access in order to cut cost and stay within budget, even though more and more content of the library collections went beyond their grasp.

2. Content Management Away from Libraries

When academic libraries had control of their collections, they were "libraries" in the traditional sense, because ownership of holdings entitled them to decide how the information should best be organized and retrieved by patrons. The information explosion, however, prompted them to reevaluate existing practices as it became clear that, contrary to library philosophy and mission, no one library could subscribe to all journals or hold all materials for their patrons (Jamali & Asadi, 2010, p. 288). A review of literature between 2004 and 2008 revealed common themes among academic libraries to redefine and reassess traditional practices and showing growing differences in viewpoints for collection management (Bullis & Smith, 2011, p. 206).

Yet, to be relegated to the role of secondary agents subject to "an array of products, business models, license terms, lease or purchase decisions, and other factors" (Fries & James, 2006, p. 87), all in the interest of linking patrons to journals stored on outside systems, effectively means that academic libraries become distribution outlets for vendors' products. This forfeiture of traditional authority and territory was entirely different, and difficult for academic libraries to fathom (Sennyey, Ross, & Mills, 2009, p. 253). In addition, there was the issue of non-perpetuity of content ownership that had to be weighed and considered. The difference between timed electronic access and a print subscription coveraging the same period was that, at the end of the term, libraries still possessed print journals whereas they would lose access to electronic journals unless extra cost was paid for archival connection. The purchase of electronic access, in other words, also locked the libraries into a never-ending payment cycle for keeping the journal contents open to patrons (Eells, 2004, p. 37).

There is a number of other serious concerns for academic libraries, particularly the possibility of vendor manipulation of the contents in their databases that prevents the information from being consistent. Eells (2004) presented one such scenario of the vendor making changes to individual title offerings, thus affecting the composition of the library's collections without notice.

> What happens when a library purchases a subscription for access to a journal, and the publisher changes ownership or the society publishing a journal decides to move their contract to a different publisher? This situation was difficult enough in a print environment, but it also becomes more problematic when a library is dealing with a packaged bundle containing up to 1500 individual titles, with a license specifying that no refunds will be provided for any specific titles that are canceled (Eells, 2004, p. 43).

The presence of ubiquitous dead links to journals and articles in vendor databases was also observed. "Sometimes this occurs because publishers of those journals pull them. At other times, the vendor decides, for whatever reason, to replace a journal with another more frequently used and/or cited one" (Herring, 2008, p. 38). Eells (2004) further described a more unscrupulous motive: the clearing off of contents specifically damaging to the vendor's business or reputation (p. 44). In consideration of these issues, electronic access became a liability to academic libraries despite the convenience to the users and the extensive coverage of content.

To be sure, on college and university campuses, strong social acceptance for new technology was reason enough for it to become incorporated into the general research tool repertoire. Boss and Schmidt (2007), in face of the pull of increased information access, admitted that "While some researchers still use a combination of electronic and print resources, most undergraduates as well as the general public prefer ER ['Electronic Resources'] because they are easier to use and provide the instant gratification desired" (p. 120). As more and more online resources became available, even scholars expressed less need to step past the library gate to browse shelves for journals. Many were happy using databases and internet search engines from home or office (Ollé & Borrego, 2010, p. 224-225).

The Ithaka Faculty Survey has been running large-scale studies on the perceptions of college faculty on library resources in an increasingly electronic environment. From their latest survey (Housewright, Schonfeld, & Wulfson, 2013) with 5,261 faculty responses, key insights revealed are: 1) comparative data from 2003 through 2012 indicated that faculty, by a large margin, have been going online, through either electronic databases or the search engines, to do research, instead of visiting the library (p. 21); 2) their starting point for locating scholarly information was likely the databases and engines, not the library website and catalog (p. 23); 3) faculty in the science disciplines, especially, preferred to do their research online by accessing resources directly (p. 22), were more willing to discard print journals for electronic-only access (p. 27-30), and perceived themselves less dependent on research and teaching support from the library (p. 64), compared to faculty in humanities.

The diminishing demand for traditional library services from both faculty and students at many academic libraries is also evidenced by the marked decrease in library gate counts. The

Association of Reseach Libraries' 2011 Annual Statistics of Library Service Trends highlighted a 60% reduction in reference transactions during the 1991-2010 period (as cited in Sidorko & Cmor, 2012, p. 2-3). The gateway role of academic libraries in their patrons' information search and discovery process has been diminishing over the years. The issue was recognized early on by Peters (2001) when he weighed the impact that electronic technologies would have on the libraries: "In the new information environment, article-level selection-for-use decisions made by end-users are more important than title-level decisions made by librarians" (p. 303). Peters' note emphasized the eventuality of a power transfer from librarians with their collection expertise to patrons growing more accustomed to information-seeking as a self-service.

For major academic publishers and information vendors, there is every incentive to take on additional responsibilities that used to be the academic library's domain. Technological advances have enabled them to further develop and refine their systems to streamline the information retrieval process. Goodman (2000) observed that "For the typical specialized networked academic resource, the marginal cost of electronic distribution to an additional subscriber nears zero" (p. 48). Once online databases became available to store and retrieve information, the technology made it almost costless to bring in new customers. Burrows (2006) pointed to the host of other resources adopting the same technology as electronic-only subscriptions became the norm: "Reference works, collections of primary sources, and even book collections can now be sold on the same basis as journal subscriptions" (p. 173).

Vastly improved database systems not only allow information vendors to negotiate better terms and prices for their products and services with academic libraries but also encourage their owners to seek greater market exposure and move beyond the normal pool of customers. As a case in point, some STM journal publishers permit the metadata of their contents to be searchable by Google and other web services, bringing in additional revenue from pay-per-view requests directly from the Web, as opposed to databases only accessible through academic libraries (Van Orsdel & Born, 2005, p. 48).

There were others opening their metadata to Google Scholar so that all information seekers, besides academia, could locate and access their journals through one-stop shopping on the Web (Burrows, 2006, p. 172). The British Medical Journal has decided to use Google's AdSense service that matches advertisements to keywords in their journal articles. Any incoming advertisement revenue was then split between Google and the publisher (Burrows, 2006, p. 172). For information serivce vendors in possession of large portions of scholarly contents and an ambition to grow profits, these transactions mark the beginning for the business opportunities springing up through collaborations with search engines like Google and other web services that target previously unknown market segments to reach newer customers.

III. Google as Catalyst

Google, a global search phenomenon, could be taken as a symbol for the culminating effect of various web technologies on the institutionalized concept of "information", that is, the tangible, quantifiable collections of resources on which knowledge and learning are based. Before Google, information was neat and organized in a logic system, mastered by a class of subject professionals. And libraries, by that definition, became the embodiment of the concept.

This section explores the paradigm shift brought by the likes of Google, the consequences that such a premise has on scholarly research in terms of research time and process, and the information-seeking behaviors of the academic community altogether.

1. One-Stop Shopping

The definition of "academic libraries", upheld by the U.S. National Center for Education Statistics in its academic library surveys, helps preserve several basic tenets of information:

1) it is physical and localized, amassed into collections and maintained in a library;
2) for management purposes, it was organized into a system so that the information seeker can follow and retrieve in the physical sense; and
3) academic librarians are experts of this organization system, who are trained to help patrons look for information in the collections.

As such, academic libraries were places that came to mind whenever information seekers needed to carry out research on campus, whether they were postgraduate researchers, faculty, students, or others of academia. They were the original "one-stop shopping" centers, offering a comfortable abundance of choices and flexibility in information (Webster, 2004, p. 20-1).

Because their holdings were physical and localized, academic libraries had been largely designed for patrons to pass through the front door and ask help from the library staff to locate items as part of research (Phipps & Maloney, 2006, p. 105). The research process, accordingly, involved making multiple visits to the campus library regardless of time and distance away from home or office until the information seeker was satisfied. Rick Anderson (2006) wrote that "In the late 1980s, for those without access to a major research collection, gaining access to needed information might require several trips to different libraries and hours (if not days) of research" (p. 30).

Once in the library, there was still no guarantee for information access due to other barriers. First, for the patron not familiar with the library card catalog to find materials the way the library personnel knew and mastered, using the system proved far more difficult than first supposed (Herrera, 2007, p. 51). Although one could walk up to a reference desk for guidance, this presented a second problem. While librarians were (though not always) available to help, the on-the-spot tutoring session or one-on-one reference interview was often brief and insubstantial to offer effective solutions to most information seekers (R. Anderson, 2006, p. 35). Patrons requiring more help and attention must be mindful of others waiting in queue. Thus, time with the librarian was always sensitive to circumstance. Information access was true to the extent that one gained sufficient rapport with a library expert to be directed expediently to one's needed information. Third, there was the lack of multiple-user access to most materials to consider. If the item had been taken, borrowed, or used by someone else, one would have had to either look elsewhere or search for a substitute (Tonta, 2005, p. 6).

2. Google's Approach

When information was organized in self-contained libraries, the best search language and strategies tended to belong to the information seeker with knowledge of the library's system, e.g., the librarian. The information explosion that came with the Web, however, demanded a different philosophy in conceptualizing information. According to Tonta (2005), "in the new economy, wealth and success are measured not in terms of ownership of physical capital but in terms of control of ideas in the form of intellectual and intangible capital" (p. 6). Indeed, the existing definition for information – one based on its physical property – no longer makes sense because whole collections of information have become disembodied and stored instead in the virtual realm of the Web. For example, the amount of new information produced in the world in 2002 was around 5 exabytes (i.e., one billion gigabyes), which was equivalent to information contained in 37,000 new libraries the size of the Library of Congress's collections. Three years later, the amount of new information doubled (Tonta, 2005, p. 3). Today, information production has inflated size to an extent not conceivably quantifiable, regardless of the existence of any super-sized libraries.

Because growth and size have gotten radically out of hand, the system that organizes this knowledge for user access must equally go far beyond the original norm. According to Wright (2009), "with millions of databases connected to the Web, and endless possible permutations of search terms, there is simply no way for any search engine – no matter how powerful – to sift through every possible combination of data on the fly." If the library system presents information as neat and organized, with expectant reliance on a suite of experts to dig through its collections, the technology of Google seems to specialize in information linking or building as many connections as possible to increase its reach of the Web insomuch that Google has woven something like a second web of the greater Web, one with the specifications of the information seeker in mind. These specifications are weighed and measured against a whole ranking system comprised of population usage statistics for calculating the various probabilities of information deemed relevant to the individual seeker. Regarding Google's approach to information access, Brabazon (2006) observed: "The cultural orientation of the search engine was engineering and mathematics, not education, library, Internet or media studies" (p. 159).

The revolution in thinking is that no one can find what one needs better than oneself. The process of identifying information directly for information seekers also circumvents the need for a knowledge expert and puts emphasis on self-reliance as a key to information access. The Google solution offers a search engine with a simple design – that universally recognizable box – on its interface, allowing the information seeker to take advantage of its proprietary reach of the visible Web which, as one researcher described, "embodied a simple, brilliant idea. It was, effectively, to ask us what we thought was important" (Brabazon, 2006, p. 159).

3. Re-evaluation of Scholarly Research

A number of evaluative studies have been completed over the years by researchers interested in comparing Google technologies to the various systems offered by academic libraries. Herrera (2011) studied the traffic data on the University of Mississippi Library's website and made the following observations:

1) there had been a steady rise in the percentage of clicks from Google Scholar straight for library resources, from 4% in 2006 to 27% in 2009;
2) their faculty seemed to go directly to Google Scholar instead of the library website; and
3) the top users of Google Scholar for library resources were graduate students in the sciences and social sciences, confirming the Ithaka survey results.

Another case study of library websites was conducted by Dixon, Duncan, Fagan, Mandernach, and Warlick (2010) from the James Madison Universities Libraries. Their findings include the confusing terminology used on many of the user interfaces, in contrast to the simplicity of Google, which made it difficult for users to follow and locate journal titles. Users opted for Google Scholar as a favorite tool for finding citations instead.

Through a combination of interview, observation, and usability studies, Chen (2006) found that while the metasearch engines used in many academic libraries had quality and timeliness of database content as strength, they were in no way on par with Google in terms of speed, simplicity, ease of use, and convenience.

Brophy and Bawden (2005) also took a case study approach by collecting both quantitative and qualitative data on the topical search queries of postsecondary student investigators using Google versus library catalogs and databases. They found that similar to the Chen study, Google was superior in coverage and accessibility, even though the library system offered higher quality and relevancy of database content.

Those studies have been useful in terms of understanding the strengths and weaknesses of different technologies. However, they only captured the essence of the moment. Whether it is Google (including later introductions of Google Books and then Google Scholar) or the cornucopia of vendor databases at academic libraries, information access systems have been in a constant state of flux, pushing the envelop a little farther in hopes of winning converts and addicts. Ultimately, the deciding factor cannot be isolated measurements of efficiencies or deficiencies but also the impact they collectively have wrought on the experience of scholarly research, changing behaviors and expectations alike for the academic community.

For one thing, as the value of time is re-adjusted with a higher price tag, a movement is being developed toward more time-conscious research, and with it, the expectation for an academic researcher to evaluate the present value of any time demand amidst the multitude of information resources now available at his or her fingertips. Rick Anderson (2006) observed that "In the current environment of information surfeit, content is no longer king. Content is cheap and ubiquitous. Today the scarcest, and thus most valuable, commodity in the information marketplace is attention" (p. 33-4). The austerity in time use, however, contrasts sharply with scholarly research as understood in the traditional library system, with its carefully compartmentalized information resources requiring the earnest researcher to devote significant time to learning about the library or acquiring the support of someone who did.

Warren (2007) presented a defense of the library system despite its toll of time on researchers. He admitted that the complex array of databases offered by academic libraries might be

frustrating to most patrons, who preferred "one-stop shopping" of the kind that Google was offering. At the same time, he remonstrated that research itself was an "educational process" in making selections of appropriate tools and language to find information. Research underlines the search for precise information, as opposed to having precise information delivered at the stroke of a key.

In spite of the contention of time as an issue, the actual process of scholarly research is nevertheless being re-defined by the emerging habits and behaviors of users. In a longitudinal study commissioned by the British Library and JISC (Joint Information Systems Committee) in 2007, researchers investigated the impact of the digital transition on the behaviors of academic researchers across generations, from undergraduates to professors, lecturers, and practitioners (Rowlands et al., 2008). Their findings revealed that "the massive digital choice, unbelievable 24/7 access to scholarly material, disintermediation, and hugely powerful and influential search engines" have altered the research behavior and process of not only Google-generation (those born after 1993) information seekers but researchers alike on today's college and university campuses (p. 293-4).

Their study also identified key characteristics of the new-age academic researcher:

1) there was little to no reading online in the traditional sense;
2) information was being skimmed as the researcher's point of vision darted across the screen;
3) the researcher also exhibited a strong tendency toward "squirreling behavior" – described as the impulse to download contents aggressively and thoughtlessly without reading because it was free;
4) the researcher was from a diverse background with far and wide consumer demographics; and
5) the researcher sought to assess the credibility of information by cross-checking different sites and relying on certain favored tools such as Google. (p. 294-5)

Their findings have gained more attraction as additional studies were published on researchers' online reading habits. One 2012 study found that researchers indeed were not spending their time reading online. They would typically keep session time short, skimming through the first couple of pages and then downloading the article for use later (Ware & Mabe, 2012, p. 37). In fact, while the reading time per article was going down from the 45-50 minutes in the mid-1990s to currently just over 30 minutes (p. 6), most researchers were also reading a lot more articles than they had in the past (Ollé & Borrego, 2010, p. 223-4). As a result of search engines such as Google and Google Scholar, they had more access to scholarly contents from a wider range of sources and they often used Google search to complement library databases (Ware & Mabe, 2012, p. 38).

Thus, if scholarly research were fundamentally an educational process, as according to Warren (2007), it would seem that most academic researchers have long recognized its virtue and adjusted their search behaviors accordingly, quite successfully so, adapting to resource availability like an extra set of options. From Google, they have learned the tricks of one form of information access, which is self-directing and much more intuitive, allowing them to connect

quickly to "ideas, opinions, data, research results, and previous learning" (Phipss & Maloney, 2006, 104). From academic libraries, they have learned the necessary search habits for another form of access, which lays emphasis on the structure and organization while allowing for instant access from "their own desktops in their labs, dorms, or homes" (Tonta, 2005, p. 6). The individual information seeker is given a flexibility in self-learning that focuses instead on one's attitudes and habits towards learning the information technology at hand as well as the way at which it can be used for their own research and education. The research process, essentially, has become user-dependent due to the increased access to information brought by the different technologies.

Hence, while Google and offshoots might be a kind of threat to academic libraries, by giving information seekers new expectations for information access, their role in instigating changes to scholarly research and advancing necessary improvements to academic libraries, concurrently, could not be overstated.

IV. Conclusion

In the immortal words of Ranganathan, "a library is a living organism," and academic libraries in the United States are by no means an exception. With the arrival of technology giants like Google, and the presence of information vendors eager to gain advantage by demanding newer terms for their products, academic libraries are struggling with a number of growing constraints such as a tighter budget for acquisitions and collection development due to decreasing or flat institutional funding, inflation in the costs just to maintain library operations, and the higher costs of electronic resources that have become staple research tools for patrons. Meanwhile, the Web has introduced into the foray a shorter and much more convenient bypass to information, excluding the need for most academic researchers to make their way to the library on campus. From seemingly disparate events, a greater social phenomenon has been emerging.

Ultimately, the U.S. academic libraries are wrestling with changing times as much as the players in their environment actively revolutionizing their system. It remains a question whether academic libraries could continue as the existing distribution network for scholarly information. If not, how would the organism be reinvented, with attention to the needs and expectations of the academic community?

What is particularly interesting and relevant to all academic libraries, however, is the very direction for the libraries' role on the postsecondary campus, minutely contested and negotiated on the U.S. soil by a great cacophony of voices calling for change. In a sense, they are titillating in experimentation to smooth out a road for the future of knowledge creation and management. While it cannot be denied that players of private enterprise, along with the Web, have brought forth a technological leap forward in terms of information access that is beneficial to higher education, the greater complexity, wrapped within the existence of academic libraries, is a cultural demand shift, one that society together must address and resolve. To what extent should the knowledge created by faculty in the course of fulfilling their obligations in research and publications on college and university campuses be owned and capitalized by the private sector for profits? Or rather, should it become part of intellectual commons to be used and shared among the community of creators who are themselves responsible for that knowledge? Academic

libraries may well be at the tipping point of change, depending on the selective choices of key players within and without the library profession in answer to this underlying argument.

Hutton (2008) found that most academic libraries have not paid enough attention to the development of digital resources for students and academic researchers (p. 505). Although online collections are expanding on the Web, academic libraries with their unique and extensive collections could create greater research value for patrons with a host of digitization projects that further add to their online presence.

In consideration of many possible next steps for the U.S. academic libraries, the road is open for opportunities. If these rapid developments in the library profession have offered any indication, the future looks to be one of promise. It is best to keep an un-bound and flexible perspective, looking at the future, after all.

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