Digital (Library Services) and (Digital Library) Services

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Abstract

This paper is an exploration of digital library services, in both possible senses: services provided digitally by physical libraries, and services provided by digital libraries. Services, regardless of the environment in which they are provided, break down into services performed on materials (technical services) and services provided to individual users and communities of users (public services). Both traditional and new services are discussed as a means for exploring the question of what a library service is. Value is proposed as the concept unifying all library services. Libraries are called upon to experiment with providing new services, and to study users' perceptions of value and methods of value creation.

Introduction

Well before digital libraries as we know them today were developed, a few forward-looking authors suggested that the future might hold tools for automating some of the functions of libraries (Bush, 1945; Licklider, 1965). The functions that these authors proposed automating were, quite reasonably, those of organizing and retrieving documents: functions that provide services to users beyond the simple existence of a library collection. Bush, for example, argues for improved indexing systems, and the benefits of the ability "to key one sheet of a million before an operator in a second or two" (section 5, ¶ 11). Licklider goes a step further and proposes that systems should "converse or negotiate with the user" (p. 36) and should display "initiative" in disseminating information (p. 37).

A host of technological developments over the past several decades has enabled the realization of some, though certainly not all, of these visions of the future of libraries, and has led to developments in libraries that were not foreseen. This is, of course, the nature of the evolution of technology; as Yogi Berra is supposed to have said, "it's tough to make predictions, especially about the future." The development of literature databases and online catalogs, for example, enabled libraries to provide users with the ability to search for library materials remotely. The development of databases containing the full text of materials enabled libraries to provide users with the ability to remain remote and

still make use of library materials. The advent of email, chat, and other forms of computer-mediated communication enabled library users to contact and interact with librarians remotely. All of these and more are services that have been made possible through the implementation of specific technologies by libraries. By implementing these technologies, as Weise (2004) puts it, librarians "have done our best to provide [users] with services so they won't have to come to the library" (p. 10). What remains unchanged, however, is the existence of the library as the organization providing the services.

The development of the digital library (DL) changes even this, however: while many DLs are projects of physical libraries, many more are not. While this has raised questions about what role libraries should play in the development of DLs, it does not change the fact that both libraries and DLs are environments in which services are provided to users, beyond the simple existence of a library collection. The development of DLs has enabled the realization of services both like and unlike those traditionally provided in physical libraries, and has enabled organizations other than libraries to provide library-like services. While the search engine is a tool, for example, the ability to search a large collection of materials is certainly a service, and one that extends traditional library services.

The implementation of technology in libraries changes the types of services that libraries may provide. The implementation of DLs changes the types of services that may be considered to be services of libraries, as well as the very definition of what a library is. What, then, is a library service?

This paper is an exploration of digital library services. This apparently simple notion unpacks into two dichotomies. First concerns the organization providing the service: the distinction between services provided digitally by physical libraries, and services provided by digital libraries. Second concerns who or what will benefit from the service: the distinction between services provided to users, and services performed on materials.

Services in Physical Libraries

A wide range of functions in physical libraries are referred to as services. The two major categories of these are technical services and user services (also referred to as public services) (Lancaster, 1993). While there is not a perfectly sharp distinction between these two categories of services (and in fact some authors argue that there should be no distinction at all, as will be discussed below), it is a distinction that is commonly employed in the library literature and in library work generally, and so for the moment will be reified here, for better or worse.

Technical Services

The Association for Library Collections & Technical Services (ALCTS), one of the many divisions of the American Library Association (ALA), includes the following as technical services: collection development, acquisitions, cataloging and classification, and

preservation (www.ala.org/ala/alcts/). This is a wide range of functions, but all are united by two common themes. First, technical services encompass the lifespan of materials in the library. The decision must be made for the library to add an item to its collection, and that item must be purchased. An item must be processed when it arrives, metadata assigned to it, and a record for the item added to the library's catalog. With use an item may require repair, and in time may be removed from the library's collection. Technical services not only occur at all stages in the lifecycle of library materials, but more importantly are necessary to the library's management and maintenance of materials in its collection. The second theme that unites technical services is a direct result of the first: technical services are critical for the functioning of a library. Without an institutional mission and a set of policies to guide acquisitions, there is nothing to distinguish a library's collection from any informal collection of materials. Without the organization imposed on materials by the process of cataloging, a library would be well-nigh unusable. Technical services, to a great extent, distinguish a library as a library.

A range of technologies exist to assist librarians to perform technical services. In fact, Integrated Library Systems (ILS), providing functionality to assist librarians to manage a range of technical services tasks, are perhaps the most widely-used types of applications in libraries (Breeding, 2002). Indeed, it would be difficult to find a library in the developed world that does not employ an ILS. An ILS contains a database of records of items in a library's collection. While many of the functions of an ILS effect changes to these records, rather than to the items that the records represent, ultimately the purpose of an ILS is to assist librarians to manage changes to the items themselves. When a user checks an item out of the library, for example, the status of the item is changed in its ILS record. Circulation of course also entails physical changes to the item circulating: the item changes location as it leaves the library, and also may be physically stamped with a due date.

As physical libraries increasingly integrate electronic materials into their collections, technical services must identify ways to manage these items. Many libraries include records for electronic materials in their ILS, even materials on the open web that cannot reasonably be said to be part of the library's holdings (Thomas, 2000). Lougee (2002) argues that libraries are taking on new functions as they integrate online resources, but that these new functions "derive from traditional functions of libraries" (p. 5). Lougee includes in the category of traditional functions such things as collection development and federation: traditional technical services functions that are now being applied to electronic materials. In the category of new functions, Lougee includes publishing and development of Semantic Web functionality. These functions are extensions of traditional technical services, in that they address various stages in the lifespan of library materials: in these cases, the addition of materials to the library's collection (due to the material being created by the library), and the assigning of metadata to materials. As in traditional technical services, these new services entail changes to items in the library's collection, though the definition of "collection" must be expanded to include items not held by the library, in either physical or electronic form.

Technical services are functions performed on library materials, functions that change the state or the condition of materials. These functions are necessary for the operation of the library. Library users, however, may never directly encounter any technical services functions or even the librarians that perform them. Library users benefit from technical services, but only indirectly.

User Services

User services, on the other hand, are provided directly to a library's users. The Reference and User Services Association (RUSA), another division of the ALA, includes reference, instruction, genealogy, and service to specific user groups as user services (www.ala.org/ala/rusa/). This is likewise a wide range of functions, but again, user services are united by a common theme: user services are those functions of the library in which users have direct contact either with the resources in the library or with librarians.

Lancaster (1993) divides user services into two categories: "on demand" and "notification" services. On demand services are "passive" or reactive, "in the sense that they respond to demands rather than initiate them" (p. 2). Notification services, on the other hand, "are more dynamic," and proactively provide information to users prior to any explicit demand or request. On demand services include such functions of the library as reference, where a librarian must wait for a user to ask a question before it is possible to provide an answer. Notification services include such functions as the creation of instructional resources (e.g., pathfinders and tutorials) which can be developed prior to any explicitly stated demand from a library user.

Many technologies exist to assist librarians to provide user services. Unlike ILSs, however, which encompass many technical services functions, most user services technologies address only one or a few specific functions. For example, applications such as Questionpoint (questionpoint.org) and Tutor.com's Ask A Librarian™ (tutor.com/libraries/ask_a_librarian.aspx) only manage digital reference services, and database systems such as NoveList® and What Do I Read Next? only perform readers' advisory functions. Unlike ILSs too, these services may have no impact on items in the library's collection. Links or citations to items in the library's collection may be provided in a digital reference interaction, and recommendations for good books to read may be made in readers' advisory, but neither of these guarantees that these items will actually be used by the library user. These services affect the user's state of knowledge; it is the user that may then effect changes – or cause librarians to effect changes – to library materials.

Heath et al. (2003) describe LibQUAL+, a methodology for evaluating users' perceptions of services provided by the library. LibQUAL+ has its origins in evaluations of services provided by physical libraries in physical space, but Heath et al. argue that it can also be used for evaluating digital services. LibQUAL+ measures users' perceptions of services across four dimensions: the Affect of Service (e.g., interpersonal aspects of the interaction between the librarian and the user), Personal Control (e.g., user's degree of control over the information environment of the library), Access to Information (e.g., the comprehensiveness of the library's collection and the convenience to the user of

accessing it), and Library as Place (e.g., the attractiveness of the library space as a place for work). Again, none of these dimensions of service have direct impact on any library materials; instead, LibQUAL+ addresses services strictly in terms of users' interaction with various functions of the library.

User services are functions performed with library materials, in which the state or condition of materials is affected only indirectly, if at all. It is instead the user whose state or condition is changed by user services.

Services in Digital Libraries

Some of the services provided in DLs are similar to those provided in physical libraries, but many are quite different. In part this is because the development of DLs has historically been strongly influenced by the field of computer science (Levy, 2000), and as Pomerantz et al. (2007) point out, the approaches to services taken by the fields of computer science (CS) and library and information science (LIS) differ considerably. Specifically, as addressed in courses on DLs in CS programs, services are generally system-focused (e.g., search engines and linking), while in LIS programs services are generally user-focused (e.g., reference and personalization).

System-focused Services

The system-focused approach to services for DLs may be traced at least as far back in time as a paper by Kahn & Wilensky (1995) in which they describe an infrastructure for digital information services. Kahn & Wilensky's paper "provides a method for naming, identifying and/or invoking digital objects in a system of distributed repositories" (section 5, ¶ 1). This paper rigorously defined terms such as digital object, handle, metadata, and repository for the first time; Kahn & Wilensky's definitions of these terms are still used in DL development today. In fact, DLs are given as merely one example of a digital information service, though it may be more accurate to refer to a DL as a set of services. Kahn & Wilensky suggest that "numerous other examples of such services may be found in emerging electronic commerce applications" (section 1, ¶ 1). Ironically, the one term that is not defined in this paper is service, though an operational definition can be inferred from the examples used in the paper: a service, according to Kahn & Wilensky's framework, is any function that can be performed on or with one or more digital objects in a repository. For example, both depositing a digital object in and accessing a digital object from a repository are provided as examples of services, as are querying and searching a repository. The presumption is that a service will add value to a digital object, and the open architecture that Kahn & Wilensky propose deliberately provides an unconstrained environment for the implementation of value-added services, specifically enabling even unforeseen future services.

This approach to services has been carried over into much of the development of actual DLs. Leiner (1998), for example, in his article about the Networked Computer Science Technical Reference Library (NCSTRL), describes an open architecture similar to that proposed by Kahn & Wilensky (1995). Leiner relies on the following definition of

services, presented by Lagoze & Payette (1998): functionality "associated with the storage, discovery, retrieval, and preservation" of digital objects (section 1, ¶ 2). In other words, services in the NCSTRL are algorithms utilized to manipulate and manage digital objects throughout their lifespan within the DL. Further, Leiner states that "some of these services are intended to support users directly; some are intended for access by machines" (Introduction and Background section, ¶ 5). There is thus no distinction made on the basis of the user or recipient of services; a service is a function of the DL as a system for managing digital objects, regardless of who or what is doing that management.

Similarly, in their discussion about the core services for the National Science Digital Library (NSDL), Lagoze et al. (2002) present functions such as search and discovery, access management, and the user interface as services. Again, services are algorithms written to perform the functionality of managing digital objects in the DL, and again no distinction is made between services for humans and services for automated processes.

It can be argued that Kahn & Wilensky's (1995) open architecture is a direct precursor to the idea of Service Oriented Architecture (SOA). Different technology companies have different approaches to SOA, and sell different products and services to assist companies to implement SOA "solutions." The common elements across these various approaches, however, are, first, the idea that services are functions (often in the form of web-based applications) that add value to the resources owned and provided by a company, and second, are modular, in the sense that they can be added or removed without affecting those resources (Channabasavaiah, Holley, & Tuggle, 2003). The notion of a "digital object" expands in this context, to include not only the types of materials that may be in a DL collection, but also business assets. Correspondingly, the notion of a service expands, to include not only functions to manage DL-style digital objects, but also more complex sets of processes that are treated as objects.

User-focused Services

Although SOAs are not DLs, the expansion of the types of services provided within DLs is not limited to the corporate sphere. A service, as the term is used by Kahn & Wilensky (1995), and all those that follow in the same vein, is implicitly defined around digital objects. Much recent work defines services instead around users. These services in many ways closely resemble user services provided by physical libraries, and in fact some are modeled precisely on such services.

Recent work has explored alternative models of DLs, and services that may be integrated into or provided alongside them. On one end of the spectrum of alternative models is the development of large-scale online communities which collectively develop a DL. Giersch et al. (2004) explore this model of a DL in the context of the NSDL. The advantage of this model of DL development, they suggest, is the range of expertise that may be brought to bear in the development of the DL, in terms of content creation, infrastructure development, and subject knowledge. Tapping into this distributed reserve of subject knowledge, Giersch et al. recommend that DLs should provide more of what they refer to as human-moderated services: that is, services that "rely primarily on direct human

intervention to fulfill users' needs" (Involvement in human-moderated services section, ¶ 1). This is contrasted with technology-mediated services, which are the same types of functions on digital objects that have been discussed above. Giersch et al. suggest that these two types of services may overlap, but that "technology should supplement, rather than substitute for, human interactions" (Involvement in technology-mediated services section, ¶ 1).

On the opposite end of the spectrum of alternative DL models is what Beagrie (2005) calls personal digital collections: informal collections of heterogeneous materials "accumulated and maintained by individuals" which may be "intended either solely for personal access or for sharing with others" (Defining Personal Digital Collections section, ¶ 3). Some of the materials in these personal collections may be fairly standard digital objects (for example, text documents, images, and video), but as digital capture devices become more ubiquitous, the types of digital objects that individuals collect is likely to expand. Beagrie points out that a range of services are emerging to aid individuals in maintaining their personal collections. Some of these services are similar to those that might be provided to aid organizations in maintaining their digital assets: for example, data storage and backup, and security. Increasingly, however, services are being provided to assist individuals to create, organize, and share digital materials. Some of these services may be algorithmic: backing up data, for example, may be performed automatically. Some of these services, however, are performed by humans, and as Giersch et al. (2004) suggest, often by a distributed community of humans. Unlike the NSDL community, which exists around the development and maintenance of a specific DL, however, these communities may exist only around the provision of the service itself. Beagrie uses Flickr (flickr.com) as an example of a service for categorizing digital photographs: Flickr is not a single DL but rather itself a service to aid individuals in organizing their personal collections of images, and individuals can provide an additional layer of service by adding tags to others' photos.

The Fall 2000 issue of Library Trends was a special issue devoted to assessing DL services. In the Introduction to this issue, Peters (2000) points out that DL services are both diverse and rapidly evolving. As examples of this diversity, this special issue included articles that addressed a range of services, including a digital reference service that is analogous to reference service in a physical library (Carter & Janes, 2000), use of DLs for education (Borgman, et al., 2000), and tools to aid users in managing task-specific collections of materials (Gorman, et al., 2000). All of these services, like user services provided by physical libraries, are provided directly to users. As in Kahn & Wilensky's (1995) framework, these services are performed with digital objects in a DL, but unlike library technical services these services do not change the condition of materials; instead these services change the condition of the user.

Discussion

The purpose of this paper is to explore the notion of digital library services, in both of the senses of services provided digitally by physical libraries, and services provided by digital libraries. Both of these break down into two similar categories: services performed

on materials that change the condition of the materials, and services provided to individual users and communities of users that change the condition of the users.

The similarity in the two categories of services between physical and digital libraries should not come as a surprise. Indeed, it might be argued that objects and persons exhausts the universe of entities that can be affected by a service, so it was inevitable that services provided by libraries – both physical and digital – should subdivide in that way. Many authors in the field of service science would in fact make this argument. Hill (1977), for example, defines a service as "a change in the condition of a person, or of a good" (p. 318). In other words, Hill defines a service in terms of change: change either to an object or to a person. Extending this approach, Spohrer et al. (2007) suggest that all services involve a "client," even services performed on materials.

The Seamlessness of Librarianship

This approach to services resonates with a line of thinking in librarianship that is now at least three decades old: the idea that all library services are user services. Indeed, it could be argued that this line of thinking is as old as modern librarianship itself: Samuel Green (1876) discusses the "great value" provided by then-modern library catalogs in assisting users to find "good books" (p. 78). More recently, however, McCombs (1985) makes a plea for increased communication between reference librarians and catalogers, in order to better inform the work of cataloging and the usability of the library catalog. Carver (2002) makes the stronger argument that cataloging is a user service on its own merits. Boissonnas (2001) goes even further and argues that all technical services are user services. Before any of these authors wrote any of these articles, however, Gorman (1979) made the far stronger argument that the division between technical services and user services should be eliminated entirely, calling the distinction "absurd and damaging" (p. 435). Boissonnas refers to this idea of the unity of library services as "deep integration" (p. 34), while Gorman refers to it as "seamlessness" (p. 435).

It is noteworthy that the idea of the seamlessness of librarianship predates the microcomputer revolution, and in fact can be traced back to at least the late 1970s, a time when automation was beginning to have a significant impact on libraries and library functions (Borgman, 1997). By the late 1970s, Borgman points out, library automation was providing users outside the library with access to library resources, and users both in and outside the library with access to resources not owned by the library at all. This expansion of access to resources, due to networked computer systems within libraries and available to users, marked a turning point in library services.

It might be argued, as Boissonnas (2001) does, that the specialization of librarianship into technical and user services is the result of the increasing professional specialization that takes place in many (perhaps all) professions. The advent of networked computer systems, however, made it possible for library functions to be wholly or partly automated (e.g., interlibrary loan), and for internal functions of the library to interoperate in ways that were impossible or at least difficult previously (e.g., the collection of circulation data to inform collection development). Perhaps more importantly, networked computer

systems allowed users to "self serve": to perform tasks with library materials that bypassed librarians (e.g., database searching).

Self Service

What Gorman (1979) believes is "absurd and damaging" about the distinction between technical and user services is the negative impact it has on the efficiency and effectiveness of library functions and librarians' work. In other words, Gorman's objection to this division is operational: libraries could provide a wider range of services, and more efficiently, if services were more closely integrated. Another objection to the division of technical and user services is voiced by Boissonnas (2001): the division does not correspond to users' mental model of the library or of information services generally. As discussed above, users often do not ever directly experience technical services functions (though they may benefit from them), so technical services may be invisible to the user. Boissonnas' objection to this division, in other words, is user-focused: libraries could be easier and more intuitive to use if services were more closely integrated.

Increasingly, services provided by organizations of all types are becoming self-service (Bateson, 1985). Lovelock and Young (1979) point out that one way to improve the efficiency of services, particularly of labor-intensive services (which library services often are) is to have customers "do some of the work themselves, replacing all or part of that previously done by the service employee" (p. 169). Schneider and colleagues (Schneider, Parkington, & Buxton, 1980; Schneider & Bowen, 1985) have found that the creation of self-service options has the potential to increase customers' satisfaction with a service.

Many services provided by libraries have followed this trend towards increased self-service, enabled by networked computing. As library services become increasingly self-serve, however, the line between technical and user services, or between system-focused and user-focused services is increasingly blurring. A service such as assistance with finding information sources, for example, once would have required a face-to-face reference interaction. Digital reference enables that service to be conducted remotely; online databases enable that service to not only be conducted remotely, but to be entirely self-serve. While reference services have not vanished, the service of finding information sources has expanded to include a wider range of tools and services, both services in which the user's state is what is primarily affected, to services in which materials are primarily affected. Indeed, when users self-serve their own information seeking, the effect of the service on the user and the effect of the service on the materials are inseparable.

Digital (Library Services) and (Digital Library) Services

Thus this discussion comes full circle, to the question posed at the outset of this paper: What is a library service? It certainly cannot be claimed (somewhat circularly) that a library service is a service provided by a library, since traditional library services are being extended and changed by libraries and by other organizations in partnership with

libraries, and are being offered by organizations that are not libraries (e.g., Yahoo Answers as an analog of a reference service).

The services in which digital libraries have traditionally been strong are services performed on materials. Given the nature of DLs as existing solely online, services in DLs have inevitably focused on what can be performed on digital materials. As a result, DLs have traditionally been environments in which new technologies for organizing, searching, and accessing digital objects have been experimented with. Services to users, on the other hand, have traditionally not been as strong in DLs.

Physical libraries generally outstrip DLs in services to users, in both range of types of services and the level of interactivity of those services. As a result of centuries of experience, physical libraries also excel at performing services on physical materials. The types of services that physical libraries perform on physical materials, however, prove to be limiting in the digital environment. Shirky (2006) explains this shortcoming by arguing that classification schemes – and by extension services performed on materials based on those classification schemes – "optimize" for the existence of physical objects, which can be in one and only one location at a time. Physical libraries consequently tend to apply service models optimized for physical objects, even when the objects are digital. Services performed on digital materials, on the other hand, need not be constrained by the assumption of physical objects, and can therefore optimize for characteristics of materials other than their physicality; Shirky suggests that services such as tagging can focus on the ideas contained in the materials. DL services on digital materials therefore in many cases outstrip services on digital materials provided by physical libraries. This is changing, however, and to be fair, physical libraries have traditionally been early adopters of technology for promoting dissemination of and access to information resources.

Physical and digital libraries have traditionally emphasized one or the other types of services, though of course not to the exclusion of services of the other type. Indeed, in the past several years there has been a convergence of the types of services provided by physical and digital libraries, as physical and digital libraries themselves converge. While cutting-edge DL work is still often grant-funded, DLs are increasingly becoming integrated into physical libraries, as DL projects and the integration of digital materials and services into traditional collections and services are being funded by "core" library funding (Greenstein & Thorin, 2002).

Out of this convergence of digital services by physical libraries and services by digital libraries emerges the potential for both to inform the other, and for new types of services to emerge in both environments. This is, in fact, already happening. Physical libraries exerted an influence on DLs from very early days. This was perhaps natural; as developers sought models for services to integrate into their DLs, an obvious place to seek these models was physical libraries. Reference, for example, was one of the first user services to be integrated into DLs (Janes et al., 1999). As DLs have evolved, other user services have emerged, with a particular emphasis on services that promote the educational impact of DLs: for example, the development of online communities

(Giersch, et al., 2004), visualization tools (Borgman, et al., 2000), and evaluation of services (Marchionini, 2000).

By the same token, as DLs and electronic content generally are integrated into physical libraries, the DL model of services is increasingly exerting an influence on physical libraries. Physical libraries are providing new services on and with library materials, from providing new tools for users to search across library materials, to new ways of integrating library materials into users' personal information environments. The University of California Libraries' (2005) report reconceptualizing the library catalog provides a good example. This report contains a set of recommendations for bibliographic services, including better leveraging the availability of the full text of documents by providing users with direct access to materials from the OPAC, and methods for integrating materials into online learning environments. Another example of digital library-inspired services provided by physical libraries is LibraryThing for Libraries (www.librarything.com/forlibraries/), which allows a library to include user-provided tags, reviews, and recommendations into their existing OPAC. These functions are challenging to implement with traditional library materials (that is to say, physical objects), but are more easily implemented with digital materials and online tools.

Finally, there are a great many services that partake of elements of both physical and digital libraries, which fall in the intersection between the two. Digital Object Identifiers (DOIs) and the DOI System (www.doi.org) is an example of a service at this intersection. To a certain extent, the DOI System is an attempt to replicate in the online environment the system of unique and persistent identification of materials that has existed in physical libraries' catalogs for over a century. Another type of service in this intersection is the bookmarklet (www.bookmarklets.com), a simple JavaScript application contained in a web browser bookmark. Bookmarklets enable users to personalize their information environment: this has always been a goal for physical libraries, but again is more challenging to implement in a physical than in a digital environment.

These are only a few examples of services at the intersection of physical and digital libraries. Indeed, it might be argued that some of these are not truly library services at all: libraries may make use of the DOI System and bookmarklets, for example, but users may make use of these tools without using either a physical or a digital library.

Value

So, what is a library service? The answer to this question may, somewhat surprisingly, come from outside of library and information science entirely, from service science. Spohrer et al. (2007) point out that all services involve a client and a provider, but even more important than that is the notion of value: that a service produces value for both the client and the provider. The idea that services are valuable is not novel in librarianship, of course; it has a long history in the literature on both physical and digital libraries. As discussed above, services as defined by Kahn & Wilensky (1995) add value to digital objects, though the nature of that value is left open. Saracevic & Kantor (1997a), on the other hand, extensively review approaches to the value of information. Saracevic and

Kantor (1997b) then present a "Taxonomy of Value in Using Library and Information Services," which they develop as a theoretical framework for studying the "value-in-use" of information and information services.

Saracevic and Kantor's (1997b) taxonomy consists of three top-level classes: reasons for using a library and information service, interaction with a library service, and results of using a library service. Each of these top-level classes then breaks down into subclasses and sub-subclasses; the taxonomy has three levels. Saracevic and Kantor refer to the top levels as classes, but in fact they are more like facets in that a single use of an information service may be categorized along all three facets. This taxonomy may be fruitfully combined with other studies of information seeking and use. Kuhlthau's (1991) studies of the Information Search Process as experienced by different user groups, for example, identify different reasons for using an information service, types of interactions, and results of use depending on the context of use. In other words, Kuhlthau's studies enable the identification of which "leaves" on Saracevic and Kantor's taxonomy particular types of users may find themselves in particular contexts, and begin to explain why certain types of services may be valuable to the user in that context.

Buckland (2003) poses the question "could library services be made more meaningful?" as one of five Grand Challenges for library research (p. 677). By "meaningful," Buckland means useful and important to the user of the service. Importantly, for both Buckland and Saracevic & Kantor (1997a; 1997b) value can only be assessed by the user of the library, service, or information. This view of value from information science is consistent with the view from service science: value is a matter of perception, and all stakeholders must contribute to the creation of a service that has value for all (Kolesar, van Rysin, & Cutler, 1998; Spohrer et al., 2007).

While the concept of value is not novel in information science, what may be novel is the notion of value as the unifying force in the conceptual space defined by system-focused and user-focused services, and between physical and digital libraries. What is a library service? Any service provided by a library for which there is value to the user in its being provided by a library. What is a digital library service? Any service provided by a digital library, or provided digitally by a physical library, for which there is value to the user in its being provided by a library. What is this value to the user? That is highly variable. Saracevic and Kantor's (1997b) taxonomy of the value-in-use of information and information services may serve as one framework for identifying forms of value for different users and user groups. It would be useful to both information science and service science to identify other frameworks for identifying value for different user communities, in different contexts, at different points in the information seeking process, and other factors. It would be useful to both information science and service science to identify what those other factors are.

Conclusion

This paper will not conclude by offering a grand unified theory of library services. The concept of value is central to all library services, regardless of the environment in which

the service is provided, or who or what benefits from the service. Both information science and service science are, however, a long way from fully understanding the concept of value, and how it is created. In the context of libraries, this is Buckland's (2003) question of how library services can be made more meaningful.

Some promising avenues for exploring this issue have been emerging. Foster & Gibbons' (2007), for example, provide unique insights into how undergraduates make use of academic libraries, and what constitutes value for that user community. Nicholson (2005) discusses a methodology for identifying the value of works in and services provided by libraries by mining the "artifacts" of use of digital libraries.

The conceptual space defined by system-focused and user-focused services, physical and digital libraries, and forms of value is a multi-dimensional continuum, into which all types of traditional library services and new "library-like" services may be placed. This paper will conclude, therefore, with a call to arms for the fields of Library and Information Science and Service Science to explore this continuum of services, and the value of these services to their users. Libraries must make use of technology to provide new digital services, and must explore users' perceptions of value and methods of value creation. Libraries provide a superb environment for Service Science to investigate new ways to produce value for users. In this way, these two fields may very fruitfully collaborate and inform each other. And in the end, it is by providing novel services – and perhaps only by doing so – that libraries can explore the continuum of services, to determine what library users value.

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