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DIGITAL LIBRARIES AS INFORMATION ORGANIZATIONS THE RE-UNFOLDING OF THE MEMORY/INFORMATION PARADOX

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Abstract

Throughout history, libraries have played a key role in remembering the past continuously adapting to changes in societal communication and its technologies. Digital libraries prove to be the next step of unfolding the memory/information paradox which is the foundation of what makes a library a library. Libraries are again changing in order to remain libraries. The focus has begun to shift from being an archive of knowledge containers – the memory side of the paradox - to being an organizer of information taking the form of information organizations. In this sense, a library does not use an information system but rather is an information system. Contemporary developments in ICT seem to harbour the capability to transform the memory/information paradox into a solvable technical problem making libraries themselves an institution of the past. At a closer look, however, the paradox re-emerges provoking the dynamics behind the discussions of what a library actually is and does in the 21st century. The conceptual elaboration of contemporary libraries as information organizations serves as a sensitizing tool for the social science study of digital libraries but also as a key to introducing digital libraries into the Information Systems community.

Keywords: digital libraries, information organizations, information systems, information growth

1 INTRODUCTION

Those who cannot remember the past are condemned to repeat it. Libraries have a long standing tradition of organizing the past by using contemporary technological innovations of their time for, what we call today, data editing and ordering. As *information organizations*, the changes, libraries have gone through over the centuries, have been tightly coupled to the developments in communication technologies - be it the shift from manuscripts to print books or the diffusion of binary-based communication media into basically every aspect of social life (Bennett 2001). However, harbingers of the rise of the Internet, such as Weinberger (2007), proclaim the end of pre-ante categorizations of knowledge organized by professional librarians; instead, we all will join into running the limitless library of libraries – the Internet. More cautious voices denounce the Internet being The Alexandrian Digital Library as a mere myth arguing that “[t]echnological progress has changed how libraries do their work, not why. [...] technology will not substantially alter the business of librarians – connecting people with information” (Kuny and Cleveland 1996:1).

In the following paper, we will rephrase the “*why* libraries do what they do” as a paradoxical form of memory and information. This distinction will serve as a conceptual frame for observing historical as well as contemporary developments within the domain of librarianship which, in addition, will also serve to identify a library in difference to other forms of organizations. According to Luhmann (2006), a social system is observable, hence identifiable, because of its difference to its environment. It is a paradox. A library, for instance, is what it is, because it is what it is *not* at the same time. Paradoxa, however, are not solvable problems; they can merely be ignored, hidden, made fun of, or be a reason for creativity (Bateson 2000); in more general terms, a paradox can only be *unfolded* creating a dynamic that might lead into a self-organizational, autopoietic form (Maturana and Varela 1992, Luhmann 1996). Consequently, we shall see the techné of librarianship as ways of unfolding the memory/information paradox that finally led to the emergence of an autonomous organization – the modern library. Digital libraries may be seen as a phase of renegotiating the difference a library needs to maintain, in order to remain a library in a changing environment – the memory/information paradox is being *re-unfolded*.

The aim of the paper is to refocus the conceptual framework of a research-in-progress on digital libraries by formulating a problem rather than reporting on preliminary results. In order to make a first step from getting-a-sense-of to making-sense-of the data, it is necessary to conceptualize what makes a library observable as a library (and not as an archive, book store, bank, and so forth). Following Weick’s (2007:14) argument that “*perception without conception is blind*”, the aim of the paper is to enrich the observation of the phenomenon. Theorizing is to be seen as a sensitizing device by making assumptions and expectations explicit. Only with a conceptual map at hand, can an observer appreciate the richness of the observed, be open for surprises that were not captured by the map in the first place.

The second aim of the paper is to open up libraries and librarianship as a fruitful topic for IS research. The key viewpoint is the observation of libraries as information organizations based on following points: 1) libraries have always used information systems in their daily routines – be it shelf-, paper-, or data-based. Constructing and maintaining an information system is the core competency of any library. In other words, it is impossible to separate the organization library from the information system it uses. The library *is* the catalogue. 2) Opposed to other forms of organizations, like for instance profit oriented firms, libraries have a self-referential approach to what information is and how it should be organized which might contribute to similar discussions on information within the IS discipline (Boland 1987, Bryant 2008).

The paper begins with a brief outline of librarian history as a process of internal differentiation of, sometimes referred to as memory institutions (libraries, archives, museums) in relation to more general developments in communication technologies. Section three introduces the reader to points raised in the Library and Information Science community in relation to digital libraries. In section 4

the memory/information paradox will be elaborated in relation to developments in IT. Section 5 concludes the paper by arguing for the viability of the concept “information organization” in relation to future research efforts on digital libraries.

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2 A BRIEF HISTORY OF LIBRARIES

A history of libraries can be constructed in relation to developments in communication technologies. In fact, it can be seen as a co-evolutionary relationship in terms of innovation and diffusion, meaning that the diffusion of new communication media (e.g. books) is coupled to librarianship developments (e.g. public libraries). Hence, the following outline should not be read as a unilateral cause-effect relationship but rather as a feed-back loop between the library and its communicative environment mediated by certain technologies (Orr 1977).

2.1 Libraries in Ancient and Medieval Times

Following Niklas Luhmann’s communication model (Luhmann 1996), a communication technology separates the direct and mutual observation of communicative participants. Opposed to talking face to face, the utterance is de-contextualized and needs to be re-contextualized by the receiver in order to be (mis)understood. Hence, the written word gains a context-independent existence. That does not yet apply to the very first forms of pictographic writing like the hieroglyphs of ancient Egypt developed around 3000 B.C., since those do not mediate communication but rather representations of things. Pictograms allow for a wide range of phonetic, semantic, and grammatical interpretations that requires adequate knowledge in order to be read and, therefore, are hardly able to mediate something the reader did not already know. Consequently, the very early pieces of writing were memory devices rather than communication technologies (Esposito 2002:45-47). Consequently, libraries were storing what was deemed worth to be remembered. Still, “[...] *there was no separation between book collections and archives; books and documents had the same outward appearance and required similar methods of storage*” (Dahl 1958:11). At that time, libraries were simply storage compartments without any organizational autonomy. They were as undifferentiated as the papyrus rolls and cuneiform tablets they stored.

A crucial innovation in terms of communication technologies is the phonetic alphabet. The simplification of writing into a digital system¹ of consonants in 2nd millennium B.C. Palestine and Syria, complemented with vowels roughly a millennium later in ancient Greece, allowed the text to become completely context free and autonomous (Borgmann 1999:45-47). While reading ideograms still relies heavily on the contextual knowledge and memory of the reader, the reading of a text based on a phonetic alphabet relieves the reader to have any contextual knowledge except how to pronounce the letters. In fact, a person can read such a text without understanding a single word. Although, alphabetic writing was firstly used as a support for mnemo-techniques (Luhmann 1998:511), it already allowed the mediation of content completely new to the reader, it allowed for the reader to be surprised – a very important aspect of information, as we will discuss further below. The classic example in terms of librarianship is, of course, the Great Library of Alexandria with an estimated amount of 743.000 scrolls collected through 3rd century B.C. Although its largest collection was still part of the temple of the muses – the Museion – we can already distinguish librarian practices and terms. For instance, “bibliotheke” was the word for the wooden or stone jars in which rolls were kept that also became the term for a collection of scrolls (Dahl 1958:18-20). The scrolls themselves were

¹ In this sense, digital does not mean binary but rather the rendering of speech into a *limited* number of *discrete* characters.

already organized by a professional class of scholars according to subject criteria, however, the catalogue was merely an alphabetic inventory list of knowledge areas and authors (Orr 1977:126). In other words, while the scrolls themselves already harboured the potential for reading to shift from remembering to learning, the catalogue still required a lot of contextual knowledge by the librarian. One had to know what one was looking for. Opposed to being a storage compartment, the library slowly turned into a warehouse with an inventory list.

While the rudimentary communication technologies changed from the usage of papyrus to parchment over the centuries, evolving into standardized documents and codices in the Roman Empire around 2nd century B.C. (Landheer 1957:18), the basic setup of libraries did not change until the final stages of the Medieval era (Dahl 1958). Parchment was increasingly used for administrative records leading to the differentiation of libraries and archives. The import of paper production techniques from China finalized the evolvement of the manuscript as a bounded entity. However, throughout the Medieval Ages, libraries (opposed to archives) were still part of religious institutions like monasteries or teaching mosques mostly dedicated to copying and preserving existing manuscripts. There was no need to change librarian routines of keeping an inventory, since a single library had to take care of a steady and rather small number of manuscripts. For instance, one of the largest monastery libraries – the Bobbio monestary library – had a collection of about 700 volumes in the 9th century (Dahl 1958:57). With the rise of universities around 12th century A.D. and the increasing number of quite large private collections throughout the Renaissance, the dominance of monastery librarianship came slowly to an end. However, the first major shift in librarianship was initiated a few hundred years later by the diffusion of the printing press and the rise of mass media.

2.2 Libraries and the Emergence of Printed Mass Media

The invention of moveable type printing by Gutenberg in the middle of the 15th century can surely be called revolutionary. Although this technology was already well established in China, it was not very successful because of the extensive number of ideograms (4-5000 different types) required to print a book (Dahl 1958:84). In comparison, the system of relatively few Latin letters turned out to be an enabler for the mass production of media. Only in the first 50 years after Gutenberg's invention, 15-20 million books were produced (Weinberger 2007). Of course, this caused libraries to reorganize their items according to size rather than topic to save shelf space. Still, the printing press also brought qualitative changes along. Besides the standardization of the book in terms of size and structure (e.g. usage of titles, paragraphs, or page numbers), it was also necessary to standardize languages in order to minimize variety to reach as big an audience as possible – a process which led to the establishment of national languages from around the 16th century on. Most importantly, printing finalized the shift from what is known to what is new and interesting – from the oral tradition of repetition and devotion (still very much alive in the handling of manuscripts) to communication (Luhmann 1998:295-299).

The differentiation of books into a communication media rather than a memory device co-evolved with the emergence of libraries as autonomous organizations by gaining an educational aspect in addition to the preservation of knowledge (Landheer 1957:98). This was achieved by opening up the private collections of the aristocracy to the public in the 17th century. Of course, at that time the public was yet limited to a small elite (Dahl 1958:177). However, printing was not only dedicated to the production of books but also of pamphlets, leaflets, and newspapers that addressed a growing literate portion of the population. The final innovation that popularized the reading of books was the novel in the 18th century. Accompanied by the invention of the paper-making machine in 1799 and the power press in 1810, reading became a comparatively cheap undertaking (Dahl 1958:220). In England for instance, so called circulating libraries rented novels out and further promoted literacy in the population to an estimated amount of 5 million until 1850 (Shapiro and Varian 1999:95). Hence, the beginning of an internal differentiation of libraries into public libraries as opposed to national and research libraries can be observed in those times. It is also the beginning of the shift from memory to information.

The establishment of libraries as learning facilities for a wide range of people and the immense growth of books and other print media marks the era of the modern library from the mid 19th century on (Thompson 1982, Svenonius 2000:2). Obviously, books – being the prime collection item of any library – are quite useful for diffusion into a wider population as they are controlled by going through a publication process, mass produced, and easy to use. Still, the notion that books preserve knowledge and hence libraries need to preserve books was and still is very much alive which Ranganathan (1931:2) came to call a “*tendency to hoard books*”. The user-friendliness of libraries, propagated by the British Museum Librarian Panizzi in the 1850ies, towards open access to the items themselves collided with the need to store the items as efficiently as possible (Dahl 1958, Weinberger 2007). In general, public libraries allow direct access by ways of organizing the items themselves. Books are being shelved according to the categories they are assigned to; hence, the way books are displayed is already informative. The dominant system, especially in Anglo-American libraries, is the infamous Dewey Decimal Classification System (DDC) developed by Melvil Dewey in the 1870ies that classifies all the world’s knowledge into 10 main categories and 100 sub divisions per category (OCLC 2003). Admittedly quite an ambitious task, it produces some biased or even embarrassing classifications because of its Anglo-American roots and the limited number of categories. For instance, the 100 divisions for the main category “Religion” are mainly dedicated to Christianity while there is only one division for Islam. As ambivalent as these open shelf arrangements may be, they allow the user to browse through the collection, therefore, to find something without knowing exactly what to look for. The library, rather being an inventorized warehouse, becomes “walkable” for usage and discovery.

On the other hand, closed shelving applies to the immense growth of books allowing indirect user access via various retrieval systems. The shift from book catalogues to card catalogues is the main result. Card catalogues, first formulated by the Smithsonian librarian Charles Coffin Jewett in 1852 based on the work of Panizzi (Weinberger 2007:59), can organize an unlimited knowledge space since it is not bounded by the limitations of books. However, browsing through a library’s stock is not possible anymore, since the user needs to comply with the librarian way of describing items. The author catalogue is only usable when one knows exactly what one is looking for. From this perspective, a closed shelf library still remains a warehouse with an inventory that only answers questions like “Does the library have the book X by the author Y?” In order for a library to be used by patrons (this is the differentiating factor between a library and an archive) it needs to provide services enabling a user to find what he/she does *not* know (Ranganathan 1931, Thompson 1982:100ff). Subject catalogues are of limited help as they are mostly based on a controlled vocabulary, meaning that items are indexed according to a standardized set of categories a user needs to familiarize with. From this perspective, a library only provides a limited number of very specific paths for discovering items. In more general terms, librarianship refocuses from the problem of preserving knowledge to a problem of retrieval – of being informative in terms of its items (Orr 1977:125ff, Hjørland 2000).

Be as it may, while industrial mass production finalized the standardization of formats like books or newspapers, the card catalogue standardized how librarian items are to be described. Already to be found in Jewett’s conceptualization, the standardization allowed for the merging of catalogues into union catalogues, first on a national and ultimately on an international level. The consequences were, for instance, that from the early 20th century on, loaning books among libraries became possible. Another consequence was the establishment of national libraries as reference libraries distributing printed catalogue cards in order to maintain the nation wide but also international quality of the catalogues (Dahl 1958:255). Especially among national libraries, cooperation became a standard practice particularly after the Second World War.

The exponential growth in the mass production of books – what today would be called information growth (Kallinikos 2006) – being archived by libraries is, in fact, an immense problem. Various authors came to question whether libraries will be capable to not only store books but also to maintain a certain level of usability or whether we would witness the decline of libraries into unusability (Thompson 1982). Various technological innovations, like microfilming, may have had temporarily

solved the storage problem, but the biggest hope is put into computerization and digitalization not only in terms of storage and preservation but also in terms of access and retrieval (Schwartz 2000). First steps were the image scanning of catalogue cards later followed by OCR scanning accessible via various Online Public Access Catalogues (OPAC). Data-based catalogues are now able to use a wide variety of IT enabled search and retrieval functionalities such as Boolean operators or ranking and relevance feedback (Hahn 1998). However, the ultimate step is the digitalization of librarian items themselves which enables users not only to retrieve descriptions about specific items but rather to access the items themselves via the WWW.

3 ON DIGITAL LIBRARIES

The domain of Library and Information Science (LIS) observes and discusses changes of librarianship attributed to the rise of the Internet (Davis and Lagoze 2000); this includes changing user behaviour (Peterson Bishop 1999), the increasing importance of documentation and preservation of online communication, especially in science and research (Ercegovac 1997), and comparisons with new information service providers of which Google is the most prominent one (Schwartz 2000, Bjorner 2006). An indicator for the ongoing discussion is the lack for a standard definition of digital libraries (Meyyappan, Chowdhury and Foo 2000). Schwartz (2000), for instance, discovered 64 different definitions of digital libraries that vary from very strict characterizations to very loose ones. If we compare these definitions with a traditional definition of a library as, for instance, presented by Oppenheim and Smithson (1999:99); “*The traditional library is defined as a specific place with a finite collection of tangible information and it is geographically constrained*”, we may come to the conclusion that either the library does not change a lot or it changes tremendously. Either a library simply includes digital works into their collections and offers corresponding services or it leaves “the place” behind offering any document any time to anyone in any place (Covi and Kling 1996:672) – a library without walls.

A second very important issue is the relationship between librarianship and ICT. Digital libraries are often positioned between these two domains (Oppenheim and Smithson 1999, Schwartz 2000). The discussion unfolds along three major dimensions; digitalization and preservation of digital media, accessibility for library users, and interoperability of librarian cataloguing. The first point refers to the difficulties of not only digitalizing analogue media but also to keep the digital content retrievable at any time. Decisions made during digitalization (e.g. file structure) have a huge influence on the preservation policy and vice versa. That is because digital documents are unable to “*care for themselves*” (Russell, Weinberger and Stone 1999:277), for digital media requires the appropriate hard- and software in order to be accessible (Bennett 2001, Kallinikos 2009).

Accessibility mostly refers to the interaction between the library and the library user. ICT does not only enable multi-dimensional search functionalities through the library’s repository but also new meeting points for face-to-screen interaction and collaboration. The discussion covers a wide range from usability in terms of screen- and interface design (Thong, Hong and Tam 2002) and the enhancement of the readability of texts on screen (Greene, Marchionini, Plaisant and Shneiderman 2000), the design of systems to improve the relevance of results of user enquiries (Marcum 2001, Tuominen, Talja and Savolainen 2003), to new tools for especially scientific users in terms of collaborative research and user behaviour (Wilensky 2000). The final point mainly discusses concerns regarding the interoperability between librarian standards of classification and metadata (Suleman and Fox 2001). Metadata standards play a key role in the future development of librarianship (Baker 2006), since they build the basis for search, retrieval, delivery, rights management, and preservation (Russell, Weinberger and Stone 1999).

Instead of observing the discussions surrounding the issue of digital libraries as a problem of developing and implementing the *right* technologies, we should rather treat them as indicators for the re-emergence of the more fundamental theme of what makes a library a library. In other words, the memory/information paradox needs to be re-unfolded in relation to a changing environment. As it will

be discussed further below, IT is one way to attempt a re-unfolding by transforming the paradox into a technical problem. The rest of the paper will be dedicated to further explore what is actually meant by memory and information in relation to the latest innovation in communication technology – binary-based media.

4 MEMORY/INFORMATION AND IT

The ways traditional libraries organize the items and their descriptions lies in the nature of the items themselves. Books, for instance, are bounded physical objects that can only occupy one place on a shelf at a time. As it is the case with the Dewey Decimal Classification System, the organization of the items turns into a system of either-or categories. Of course, all the books could have been piled up into an immense heap but, as a consequence, finding what one was looking for would turn into an event of luck. Therefore, having any order is better than having no order at all. In other words, one can find something *because* not everything is findable. Naturally, any classification system hides and distorts. This already begins with the collection policy of each library that is, in fact, a selection policy. In principle, that does not change with the introduction of a separated second-order search and retrieval system – the card catalogue. It only allows answers to very specific questions, on the one hand, by relying on the standardized attributes of books (the name of the author or title) and, on the other hand, by relying on librarian standard procedures of adding further descriptions such as keywords which are based on an existing pre-ante classification system. However, with the rise of ICT and ultimately the Internet, the established formats do not apply to new forms of online communication such as hypertexts.

In order to avert misunderstanding, digitalization should not be understood as the end of books or paper-based media in general. As Brown and Duguid (2000) argue, digitalization does not mean de-paperization. The paper-based domain of books and newspapers, on the one hand, and the binary-based online world, on the other hand, are not mutually exclusive but rather complement one another. Still, librarian 1st order categorization – organizing the books themselves – as well as 2nd order categorization through organizing descriptions of books – the catalogue – are based on the standardization of specific communication technologies as packaged media (Esposito 2002). Books, seen as containers of knowledge, have been organized the same way as any other mass produced good (Svenonius 2000:10). To some extent, this is still applicable to packaged digital media such as CD-ROMs or digitalized versions of books. However, the rise of hypertextual, networked media (Esposito 2002), of dynamic, unstable, borderless online digital media (Svenonius 2000:12) brought librarian collection practices back into the centre of attention². So what is a library actually organizing – is it really simply books and the knowledge they contain?

4.1 What is a Library organizing?

Roughly in the middle of the 20th century, the incommensurable growth in mass printed media made librarians rethink the role of libraries similar to the situation today. The answer was the introduction of another difference – that is the difference between work and item. As Svenonius (2000:9) reports, the first explicit distinction was made by Julia Pettee – chief cataloguer of the Library of Union Theological Seminary in New York City – in 1936. She described a particular message content as a “library unit” and its embodiment in a medium as a “book”. In 1955, Ranganathan laid the foundation of what came to be the Functional Requirements for Bibliographic Records (FRBR). Ranganathan distinguishes between “work” as an expressed thought and “document” as an embodied thought. Finally in 1995, the International Federation of Library Associations and Institutions (IFLA) developed a four level model of work, expression, manifestation, and item (IFLA 1998). *Work* is

² At a closer look, not even a book is as stable as it may seem if we, for instance, think of different editions and translations.

defined as a distinct intellectual or artistic creation – an abstract concept that is realized through an *expression* in the form of alpha-numeric, musical, or choreographic notation, sound, image, object, movement, etc., or any combination of such forms. The physical embodiment of an expression of a work is referred to as *manifestation*. Finally, an *item* is a single exemplar of a manifestation. For instance, Shakespeare's Hamlet (work) is realized as various English versions and translations into other languages (expressions) which are published as hard-cover and paperback editions (manifestations) and one exemplar of each (items) is available in a library. Now, a peculiarity of modern libraries, since they are dealing with mass-media rather than unique archival records, is the organization of items (things) and works (abstract concepts) (Svenonius 2000:10). As Svenonius (2000:11) further elaborates in reference to Panizzi, this is quite an important distinction, since a user may know the work but not the peculiarities of different editions.

The introduction of IT into librarian services in the form of databases put a lot of emphasis on the item level. Information technology treats information like a thing that can be manipulated, ordered, and categorized at will, or at least so it seems (Buckland 1991). Of course, this notion is based on a very specific definition of information provided by Information Theory founded by the work of Claude Elwood Shannon (1993). Accordingly, information is a selection of a message out of a number of pre-selected messages based on the design of the communication channel between a sender and a receiver. The information value of the message sent derives from the number of messages it was selected from. Therefore, the informativeness of a message lies not in the message itself but in what else could have been sent. The basic measurement unit is a binary digit of 0 and 1. For example, sending the result of flipping a coin has an information value of 1bit – 0 for head, 1 for tail. Shannon's model is a basic input/output model of what comes in should come out at the other end as efficiently and undistorted as possible. However, in this model we do not find a differentiation between message or signal, on one hand, and information on the other hand. In other words, information and document – or in other words data and information - are one and the same (Lee 2004). Treating information as a countable thing, however, leaves the receiver completely out of the picture. In order to understand, the receiver needs to distinguish between noise and message which is based on her/his expectations. In fact, when pure noise complements the receiver's expectations it is meaningful for her/him hence informative without the intention of a sender. Information lies in the eye of the beholder and is not a factual thing with an existence of its own. Consequently, even the absence of a signal may be informative for a receiver or as Bateson (2000:458) puts it: "*The letter which you do not write can get an angry reply*".

Accordingly, books and catalogues may not be considered as *containing* information but rather having the potential of triggering the event of informing a reader and user. What books and catalogues contain is mere data that is organized in a way that is expected (by the author/publisher/librarian) to be potentially informative for somebody (an anonymous mass audience of readers, library users). However, the technological innovations in terms of data processing and ordering propel the librarian abilities to deal with items (things) but fail to notice the importance of organizing works (abstract concepts) as well (Svenonius 2000).

4.2 Memory and Information

The observer-related nature of information has been expressed by Bateson (2000:459) in his renown definition of information as being *a difference which makes a difference*. This concept has mostly been interpreted as information having an element of surprise or novelty (e.g. Luhmann 1996, Kallinikos 2006). In other words, a difference has to be informative for an observer and only then does information occur (Wildavsky 1983). Information has no existence of its own; it is a no-thing, an event that loses its informativeness for an observer the moment it is observed. This led Kallinikos (2006) to call information non-foundational and ephemeral, hence it can neither be stored nor produced. In short, information is not what triggers change nor what is changed but the change itself. Based on this concept, books contain potentialities for information for somebody. For instance, reading an English text without knowing English is of course possible but for the reader the work remains pure noise

without any meaning. Now, this is the crucial aspect that allows for a further elaboration of the shift of writing/printing from being mostly a memory device to a communication technology that mediates what the reader does *not* know. Mass media in general (e.g. TV channels, newspapers, radio channels) deal foremost with delivering exactly that (Luhmann 1996)³. Information, therefore, is closely attuned to learning rather than to knowing (Wildavsky 1983).

The same applies to the ways library items are organized and documented. Beginning with a mere inventory list, the documentation had no potential of informing a user. It only told where to find a specific scroll, manuscript, or book the user already knew about. To be precise, we cannot even think of a library being *used* at that point. A library was a memory or an archival function of mostly religious and later on secular institutions. Just as we cannot speak of users during those periods, in fact, neither can we speak of libraries as such. Only when the notion of education was introduced did the organization of library items start to turn into an informative system. Walking through an open shelf library or using a subject catalogue allowed the user to be surprised even when, admittedly, in a rather limited fashion. The crucial point, however, is that libraries started to reflect on how to make the immense amount of items or, in other words, data informative. Developments in ICT seemed to be the solution to all the problems (Thompson 1982). The paradoxical form of memory/information seemed to be, after all, only a technological problem soon to be solved by implementing state-of-the-art library information systems (LIS). As already mentioned further above, technology only deals with the problem of managing the immense growth of data but not the problem of information. “*What is processed in information systems is only data (or potential information)*” (Hjørland 2000:32). The problem of information is how to actualize information out of these immense pools of data (Wildavsky 1983).

At this point, we may return to the notion of memory in order to further specify the term. Memory should not be seen as a storage of past events; it is rather an expression of recursivity (Esposito 2002). It is the capability to observe sameness in difference, to construct repetition and hence what is already known. Information only occurs in comparison to what is remembered as well as forgotten. Memory is not a stock but rather the organization of observing information. Hence, we can formulate the memory/information paradox; memory is necessary to recognize information and information is necessary for the construction of repetition. Without memory everything and nothing is new and surprising. From a temporal perspective, we end up with the chicken and the egg; what was there first, memory or information - the observation of repetition or novelty? In order for an event to be observed as novel, it needs to be distinguished from what is repeated. From a factual perspective, we come to a tautology; in order to describe memory we refer to information and vice versa. By definition, a paradox does not offer a solution but rather the oscillation between the two sides of the form. In our case, the form is the library. It is the difference between memory and information. Consequently, librarianship is the self-observation of the form – the observation of the memory/information paradox based on the paradox – that oscillates between the two sides. In other words, memory is differentiated from information by applying the memory/information difference.

Similar to the argumentation on the potential information further above, books and catalogues do not remember but rather provide a potentiality for repetition and hence remembering as well. Memory and information are two sides of the same coin. Coming back to the difference between works and items, the organization of the fuzzy, abstract level of works by defining different items as being the same, is what makes a library an information organization. It constructs, like in every classification system, categories based on abstract definitions (works or keywords) to which physical items are assigned to. Sameness in difference and difference in sameness is just another way of phrasing the memory/information paradox. However, the self-referential closure of librarianship into an autonomous organizational form due to the mass production of books and the re-orientation towards

³ It is hard to imagine to read, for instance, a newspaper with the front-page title “nothing new happened today” or to watch a TV channel broadcasting the same shows, series, and movies every day.

being used is the key aspect that differentiates a library as an information organization in comparison to archives or museums which, so far, have remained mostly on the memory side of the paradox. In short, an information organization organizes the memory/information paradox in order for it to be a difference that makes a difference for an anonymous audience.

5 LIBRARIES AS INFORMATION ORGANIZATIONS – AN OUTLOOK

In this paper, libraries were introduced along the difference of memory and information in relation to developments of communication technologies. The emergence as an autonomous organizational form was outlined as a process of increased differentiation from its relevant environment that led to a shift from a focus on memory to a focus on information and retrieval – a form termed information organization. However, building an argumentation of libraries being information organizations based on the observational form of memory/information needs further development in order to being applicable to contemporary developments in librarianship. So far, the focus was on how libraries do what they do which is not a distinguishing characteristic anymore. Because of the converging, interoperable nature of binary-based media, libraries, archives, and museums become again less and less distinguishable when offering their services online. Additionally, other non-librarian organizations also provide information services online. Google, especially after launching their massive book digitalization project, seems to fulfil an equivalent function to what libraries were doing in the 20th century – connecting people with information. However, if we change the question of how into why a library does what it does, the difference becomes quite obvious. Google, like every commercial company, is a business oriented enterprise; consequently the reason why Google does what it does is simply profit. It seems a very trivial point to make, but rarely considered by harbingers of the end of libraries such as Weinberger (2007). The private sector has different goals than the public sector and fulfilling the role of an archival trustee in terms of provenance is not one of them (Jeanneney 2005). The Amazoogle of the Internet organize information to make money, but they are not information organizations in the sense of this article. In other words, digitalizing and indexing books is not what makes a (digital) library. What is it then?

Another point to be considered is that basically every organization can be observed according to the memory/information difference. Every organization “uses” information to make decisions, hence a relationship to memory is easily established (Wildavsky 1983, March 1991). After all, organizations do store and retrieve documents via an information system. Still, there is a difference between *having* a library and *being* a library – between using an information system and being an information system. Libraries are solely based on the dynamic relationship of memory and information. They establish a self-referential notion of the memory/information paradox leading to further differences (such as work and item) which in turn distinguishes librarianship from an IT centred organization of information-as-things (Buckland 1991). In order for libraries to remain libraries a re-unfolding of the memory/information paradox seems to be required which can be subsumed under the rather broad concept of digital libraries which, in fact, is not distinguishable from digital archives and museums anymore. The term information organization is expected to help to appreciate the peculiarities of these public information service providers in the next steps of the research. It directs the analysis towards contemporary changes without leaving historical developments behind.

Finally, the librarian memory/information distinction highlights different aspects than the predominant knowledge/information and data/information distinction in the IS field. The conceptualization of memory/information as a paradox expounds the limitations of IT – i.e. being capable to only solve problems - in a new light. The ways libraries re-unfold this paradox due to changes in societal communication and technological developments (mostly accomplished outside the domain of librarianship) is an excellent example for dealing with the increasing and boundary-crossing data-pollution and noise, basically every organization has to face.

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