Digital library as an autopoietic social system

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Introduction

In this paper, I will be taking a look at the idea of digital libraries as social systems. I will start by giving a short account of what it means to define digital libraries as social systems followed by a brief discussion of the view of digital libraries as ecosystems or ecologies.

Due to the length of this paper, I will move swiftly on from a focus on Lankes’ idea of libraries as conversation to an introduction into the cybernetic thinking that his ideas originate. This will lead towards the sociology of Niklas Luhmann and the proposed view of digital libraries as an autopoietic social system. This essay will close with a brief look at how such a view could influence its future.

For the purpose of this paper, I will follow Karen Calhoun’s definition of digital libraries as “systems and services... that... contain[s] managed collections of digital content intended to serve the needs of defined communities” (2014, p.18).

Digital libraries as a social system

What does it mean to define digital library as a social system?

From the early parts of 1990s, when the National Science Foundation started workshops on making digital libraries a reality (Calhoun, 2014, p.1 and p.10), through to the second decade of the new millennia, digital libraries have evolved to value “efficacy for supporting their communities and web-based, real world practices in information seeking, learning, research, knowledge creation and dissemination, work and play” (Calhoun, 2014, p.52).
There are certainly many aspects in the development of digital libraries that have moved the perspective of libraries as collections containing fixed documents used by individuals to an emphasis on connecting people, where information access involves “social interaction, collaboration or communication” (Chowdhury and Foo, 2012, p.87).

Calhoun (2014) has listed a broad range of possible community benefits that digital libraries could bring. The following are just some of the examples she gives:

In terms of broadening the access to content, digital libraries have the ability to give more opportunities for more content to be collected. They also offer greater access for more people and in a wider context.

In view of the rights of creators and the providers of content, digital libraries could offer a better balance in relation to greater access to the general public.

The ability to make information mobile, especially in the age of wearable technology is also a plus. This could lead to a free flow of ideas towards a Popperian open society.

As a component of infrastructure, digital libraries enable the exchange of information as well as its re-use. It can support our understanding and appreciation of the ever-increasing volume of information.
Digital libraries could also be seen as places where work is shared, offering a space for enlightened and progressive dialogue and easing the contact between content, creators and the general public.

The empowerment of individuals through the support of self-education and improvement is evident from a social perspective. Digital libraries could lend a hand in the creation and running of personal digitalisation projects. It allows greater pursuit of cultural, professional and personal interests as well as increasing our awareness in terms of social and political issues. In developing our critical awareness, digital libraries could offer wider support for information literacy and therefore offer easy access to desirable information for everyday life and work.

Digital libraries could help advance formal education by providing provision for an online learning environment.

In terms of its affinity to the progress of knowledge, it could help maintain the knowledge work in specific academic communities, allowing cross access and multidisciplinary flow of knowledge through communities. This has the effect of boosting intellectual interactions, opening up intellectual dialogue to a wider audience and supporting the academic values of legitimisation, dissemination and access.

Digital libraries also have economic benefits. They give quick access to intellectual and national cultural assets. This has the effect of increasing the output of researchers, academics and entrepreneurs by nurturing a platform for new encounters and discovery and as a result, increasing the flow of knowledge transfer.

And finally, digitisation could save intellectual and cultural assets for the future generation, as well as providing a space for the teaching of preservation (see Calhoun, 2014, p.146-147).
According to Calhoun (2014, p.77), digital libraries have already made great progress in terms of improving the “discoverability and accessibility of scholarly and cultural heritage content”. If digital libraries were to play a stronger social role and engage deeply with the community, whatever that may be, then Calhoun suggests that the following questions are worth considering:

- How come some digital libraries have a unique impact while others are comparatively ignored?
- How do we embed digital libraries more effectively in the discovery environments of the web?
- What are the boundaries in terms of community engagement in digital libraries and how could they be crossed?
- How do we improve web-based scholarly collaborations by contributing to the revitalisation of the communicative processes and accessibilities of knowledge and scientific discoveries?
- How should we accentuate the emphasis on the societal and community-based roles of digital libraries in favour of traditional concerns of the collections and information processes?
- How do we change the conception of digital libraries as that of a colossal amount of trustworthy and reliable online content that is useful to the communities which they serve rather than as a collection existing for its own sake?
- In what ways could a focus on individual preferences, practices and informational needs help digital libraries address its realignment in relation to its social roles?

(see Calhoun, 2014, p.77-78)
As an ecosystem, digital libraries can also provide new opportunities for social learning. This was demonstrated in an earlier study involving youths using digital libraries (Pang, 2012: 86).

The notion of an ecosystem has been repeated by several writers within the realms of digital library (see Liew, 2014, Pang, 2012 and Calhoun, 2014 to name but a few). Calhoun (2014, p.203) noticed that from 2005, “a number of JISC-supported reports appeared, referring to repositories as elements of an emerging ‘ecosystem’ or ‘ecology’ of scholarship, knowledge creation, discovery, use and transfer.”

In a chapter titled ‘Ecology of Repositories’, Heery and Anderson (2005) reported that exciting works were “emerging considering interaction between repositories in the context of the digital library and learning community” (Heery and Anderson, 2005, p.14).

Pang (2012) noted that despite differences in the ideas of digital libraries between researchers and practitioners, “digital libraries are essentially social in nature” (Pang, 2012, p.86).
Calhoun continues by saying that both ecosystem and ecology suggest an environment, with “discoverable interrelationships and systematic interactions among the elements of the system” (2014, p.204). At the time of writing, repositories were isolated and dispersed, but taken as a group, they can be described as a “conglomerate” through the use of technology (see Calhoun, 2014, p.204).

In a paper titled ‘The noncybernetic nature of ecosystems,’ Engelberg and Boyarsky (1979) argued that ecosystems comprise of cybernetic subsystems, but “the existence of feedback loops... is insufficient to characterize the whole ecosystem as cybernetic” (Engelberg and Boyarsky, 1979, p.323). This view was rebutted in a paper by Patten and Odum (1981), contending that what the issue “ reduces to at this point is philosophical acceptance or rejection, respectively, of a systems point of view” (Patten and Odum, 1981, p.890-891). The real issue, they later concluded, is not whether ecosystems are cybernetic or not. This, they said, is merely a “pseudoissue” (Patten and Odum, 1981, p.893). “The basic problem,” they quoted Engelberg and Boyarsky, “is how to think about ecosystems, and how to place them within the scheme of known systems” (Patten and Odum, 1981, 894; Engelberg and Boyarsky, 1979, p.323).

As the idea of what is an ecosystem is such an unresolved issue, I feel that it is untenable to frame digital library as an ecosystem. Indeed, many ecologists themselves prefer not to think about ecosystems at all” (Patten and Odum, 1981, p.894).
Digital libraries as an autopoietic social system

“Knowledge is created through conversation. Libraries are in the knowledge business. Therefore, libraries are in the conversation business” (Lankes et al., 2007, p.17).

R. David Lankes, along with Joanne Silverstein and Scott Nicholson (2007) proposed the idea of the library as a facilitator of conversations. They explained that the fundamental aspect of conversation theory is that “people learn through conversations” (Lankes, et al., 2007, p.18).

Despite the fact that different groups have different principles of conversation, they note that people “establish meaning through determining common definitions and [build] upon shared concepts” (Lankes, et al., 2007, p.18).

Library catalogues, for example, “facilitate(s) conversations as oppose to simply presenting… information (Lankes, et al., 2007, p.26). By allowing users to participate in a conversation, the library catalogue helps them construct knowledge (Lankes, et al., 2007, p.26). He also suggests the additional services such as blogs and wikis (Lankes, et al., 2007, p.18).
“It remains true that... communication already presupposes knowledge, and that society is unable to communicate - and therefore unable to exist - without any knowledge” (Luhmann, 1994, p.11). “A social system emerges when communication develops from communication” (Luhmann, 2006, p.47).

Lankes’ main source of inspiration came from the thinking of the celebrated British cyberneticist, Gordon Pask. Pask “developed an extensive theory of learning that required the development of a second order cybernetics...” (Rocha, 1996).

During the height of cybernetic interest, Pask attended a conference organised by Gregory Bateson. Bateson was determined to “explore how the reflexive implications of cybernetics could provide the basis for a new epistemology” (Hayles 1999, p.75). A personal and reflexive account of the conference was published in the book, Our Own Metaphor by Mary Catherine Bateson (2005).

According to Wolfram Lutterer (2005, p.501), Bateson had already voiced “a clearly reflexive image of cybernetics... within the framework of his communications theory”. A more radical view was on offer however, from the theories of Humberto Maturana in the form of autopoietic systems (see Vanderstraeten, 2001 p.299 and Hayes, 1995, p.85).

The basic premise of cybernetic thinking is that of the feedback loop, where stability is achieved through the flow of information between the environment and the system. An autopoietic system also maintains stability through the notion of feedback, the difference is information no longer
flows between the environment and the system. Instead, this information flow is self-produced internally and its only goal is to maintain stability through its own organisation (see Hayles, 1995, p.88).

“In the autopoietic perspective, no information crosses the boundary separating the system from its environment” (Vanderstraeten, 2001, p.299). Because it is a closed system, events from the environment could only trigger actions within the system (see Hayles, 1995, p.76). The difference between the system and its environment is established through observation (Cramer, 2001, p.3). Katherine Hayles (1995, p.75) explains that “[t]he divorce of perception from external reality is at once the basis for the striking originality of Maturana’s epistemology and the Achilles’ heel that renders it vulnerable to cogent objections.” As reflexive cybernetics evolved, a clarification of observing systems came from the unlikely source of George Spencer-Brown (1969) and his calculus of indications.

“Observing simply means... distinguishing and indicating” (Katti, 2002, p.54). “We take as given the idea of distinction and the idea of indication, and that we cannot make an indication without drawing a distinction” (Spencer-Brown, 1969, p.1). The importance of social aspects within the field of reflexive cybernetics was later emphasised in the systems theories of sociologist, Niklas Luhmann.

Luhmann applied his social system theories to a variety of fields, although I am unaware of any applications relating to the field of library science. In Luhmann’s sociology, we would find the following transformations of the above:
1) “The observer now generates the system by drawing a distinction” (Hayles, 1995, p.95).

2) Social systems are operationally closed- “The difference between operational and informational closure is revealing” (Hayles, 1995, p.96).

3) “Society is an autopoietic system that uses communication as its mode of reproduction” (Vanderstraeten, 2001, p.304).

4) Human beings are merely “psychic systems... structurally attached” (Lutterer, 2005, p.502) to an observed system.

From a Luhmannian point of view, the world of the digital library is a sub-system of society and thus remains autonomous. Because they are organised autopoietically; one sub-system cannot make changes to another. Whatever said or done within the political world for example, cannot affect the world of digital libraries as a social system directly.

The digital library as a social system uses communication as a mode of autopoietic reproduction. That is to say, the elements of a digital library are “reproduced by a network of communications and... cannot exist outside of such a network” that is the digital library system (Luhmann, 1986, p.174).

According to Luhmann’s thinking, if you attempt to exit the perceived boundaries of what is considered as part of the social system of digital libraries and perform actions which are defined as part of what constitutes
the social system, you would only end up broadening its boundaries. For as long as your communication is related in whatever way to the social system of digital libraries, you would inevitably re-enter the system as Spencer-Brown had shown: “If we observe such a re-entry, we see a paradox. The re-entering distinction is the same, and it is not the same. But the paradox does not prevent the operations of the system” (Luhmann, 1995, p.42). So by distinguishing a distinction, we are only postponing the problem (see Vanderstraeten, 2001, p.301).

By adopting a generalised version of Manturana’s closed self-organisation to the social picture of a digital library system, the application of Luhmann’s theories gives professionals working within the world of digital libraries something to ponder. Since the notion of regulation and control is out of the hands of the individual, it is impossible for any person or for that matter, any human collaboration within the world of the digital library to make full control over the system’s operation.

A common uncertainty appears when most people approach Luhmann’s theories for the first time. Questions abound as to where we locate the digital library user in relation to the closed system. Luhmann recognised the fact that Spencer-Brown forces us “to perform the calculus the same way he does, and thus not distinguish between different observers” (Luhmann, 1999, p.19). Placing the observer outside of the system reduces the “problem of the observer to a problem of communication among systems” (Hayles, 1999, p.134).

Although digital library users do not directly control the conversations of the system, “the structures of either system involved are changed due to the influence of the other system” (Vermeer, 2006, p.87). The conversations of
a digital library user are elements of these communicative systems. Since “[d]ifference creates boundaries” (Vermeer, 2006, p.24) and conversation is the production of unexpected information, in a Luhmannian digital library as a social system, a digital library user is in the position of drawing further distinctions.

“Observation of another system makes it into a system incorporated into the observing system” (Vermeer, 2006, p.22). So as observers, the digital library user is also a set of systems, “i.e. with different types of communication” (Vermeer, 2006, p.86). This is remarkably different from the view of library users as members of different external groups. Interaction is presupposed in Luhmann’s system, otherwise communication would cease to exist. Although communications themselves have no priority over a system’s existence, “communicative coordination helps to constitute and structure systems” (Vermeer, 2006, p.64).

**Conclusion**

Applying Luhmann’s social systems view to digital libraries does not give us any practical solutions to the everyday problems of how to further our engagement with digitalised documents, but that’s not to say that his sociology is of little value to us. Luhmann provides us with the fundamental reason for the study of interactive models of communication, as it provides the much-needed area to broaden the boundaries of digital libraries as a social system. It offers one of the strongest supports for the opinion that communication is of great importance to digital libraries. By defining ourselves in relation to digital resources, we are distinguishing ourselves as inhabitants communicating within the environment of digital libraries.
References


