A Phenomenological Study of an Emergent National Digital Library, Part I: Theory and Methodological Framework

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This study of the activities surrounding the National Digital Library Program (NDLP) at the Library of Congress (1995-2000) focuses on institutional processes associated with technological innovation in the library context. The study identified modalities of successful innovation and the characteristics of creative decision making. Theories of social change and organizational rationality, and the social construction of technology (SCOT) approaches provided the theoretical basis for this study. The underlying design for a phenomenological approach is discussed, together with the method for constructing a descriptive narrative that synthesizes the phenomenon under study (an emergent national digital library program). Theory, methodology, data collection, and the summary of findings with implications for practice are presented here. The accompanying article, Part II (available as an electronic-only article in this issue), presents the narratives of development, applying the interpretive phenomenological framework to document the innovators' perspectives about this formative event.

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This study focuses on a major transformative event, the National Digital Library Program

(NDLP) at the Library of Congress (1995-2000). This event provides a model for

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studying institutional change connected to technological innovation and library development in the U.S. context. The interviews with seven individuals (policy makers and digital library developers) conducted two years after the end of the project provided the basis for a synthesis of knowledge about that phenomenon, and an exhaustive narrative description. This study examines the emergence of a national digital library by assuming a constructivist view of technological development from the perspective of innovators. The research questions posed in this study are:

- What are the modalities of a successful innovation process?
- How can the characteristics of creative decision making be identified retrospectively?

The main thesis of this research project is that understanding technological innovation in the library context depends on providing an insight into how innovators and the environment (structure) are shaping innovation decisions. Therefore, the individual decision makers and structure were considered as variables shaping the process of technological transformation. Structure is considered at three levels: society (external to the organization), professional norms (external and internal), and organizational pressures for efficiency and control (internal to the organization). This study aims to explore and describe the organizational process from a holistic perspective as the first step in developing models for studying similar projects of the initial digital library boom (1998 to 2002) and to advance reflection on the nature of historical (transformative) processes in the context of the library institution.

The digital library emergence is a major transformative force in the recent history of the library institution. Therefore, it provides meaningful engagement for library historians (or library sociologists). In this paper, discourse around the interpretation of technology is set center-stage and the "digital library" considered as a socio-technical artifact[2] [1], thus

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[2] In her influential definition of digital library, Christine Borgman clearly refers to such a complex of social and technological aspects of these new electronic collections. Their relevance is maintained in specific institutional settings and contexts of use. She states; "Digital libraries are a set of *electronic resources* and associated *technical capabilities* for *creating, searching, and using* information. They are an extension and enhancement of *information storage and retrieval systems* that manipulate digital data in any medium. The content of digital libraries includes *data*, and *metadata*. Digital libraries are *constructed, collected,* and

responding to the criticism that technological concerns are often absent from the history of libraries. By focusing on narratives of institutional development in the context of an emergent digital library as an approach to developing a new methodological framework for the historiography of libraries, this study documents the experiences and social change most prominently affecting libraries in the past decade. The digital program of the Library of Congress—officially, the National Digital Library Program, or NDLP, lasting from 1995 to 2000—is the research site for this case study. The theoretical framework, methods for data collection, and summary of major findings with implications for practice are presented in this paper. The accompanying article, Part II (available as an electronic-only article in this issue), exemplifies the empirical process of an interpretive phenomenological framework, documenting the variability of the innovators' perspectives about this formative event; it is the "telling of the story"— constructed from an interpretation of the stories of development presented by the digital library developers. While the narrative outcome of this study fills a knowledge void about innovative processes and the development of new best practices, at the same time it contributes to the debate on the scope, theories, and methods of library history and social change.

DIGITAL LIBRARY AS OBJECT OF LIBRARY HISTORY

Discourse about technology is a major determinant of professional practice today, a key determinant of library development over the past fifty years, and the major focus for the history of cultural processes mediated in the context of institutions. Digital and digital(ized) libraries are an emergent type of collection by which traditional use new technologies libraries to extend their services. Their development involved a transformation of the collections of recorded knowledge; it influenced the public perception of the library institution, and contributed to redefining the mission of libraries, records, and library use. Digital librarianship is an emergent organizational field characterized by experimentation, symbolic uncertainty, and ambiguity of institutional roles for these professionals. Although digital libraries made a profound impact on the

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organized, by (and for) a *community of users*, and their *functional capabilities* support the information needs and uses of that community" [1]. They are not mere repositories of data, neither are they reducible to technologies for the access of data.

library profession in the past decade, institutional transformation itself has not been an object of extensive research. This is one of the broader contexts in which the phenomenon of digital library development is significant beyond a particular case study. Recent debates on the subject as well as on the focus of library history provide another context. The crux of these debates is presented next.

In their recently published discussion on library history as a field of scholarship [2-3], Davis and Aho raise questions of its academic status and the centrality of the field to mainstream history, library and information studies, and book history. They conclude that narrowly practiced library history ("focusing narrowly on the institutional histories") resulted in the field systematically neglecting the "connections or the nexus between the culture and the library" [2, p. 177]. Likewise, an increasingly technological world has been neglected by library historians. All this has contributed to the isolation of the field.[3] Because it is seen as a field defined by overspecialization, lack of a theoretical framework, strict focus on facts, and perceived lack of relevance in explaining current processes affecting libraries, library history as academic discipline and its vitality in connecting to areas of practical application are threatened. "Contextuality, an ever-increasing appreciation of the library as a cultural and social institution and the desire to link this to historical research" is seen as a productive direction for library history [2, pp. 186-187]. Jonathan Rose [4] examines six possible models (not mutually exclusive) for library historians: information science, mainstream history, book history, critical theory – including postcolonial and literary criticism – cultural history, and an integrated and interdisciplinary approach to book studies.[4] In his recent editorial published in *The Library Quarterly*, Wayne Wiegand identifies the library as the cornerstone of the "public sphere" in a Habermasian sense [5], thus opening discourses of power and social

[3] That research path more often than not led the researchers "out into an academic wilderness" [presenting an opportunity for the journal *Libraries & Culture*] "to make a lonely witness to a scholarly world that seemed more preoccupied with other matters" [2, p. 179].

[4] This approach conceptually corresponds to the interdisciplinary programs in *Buchwissenschaft* established at several German universities [4, p. 57].

action as part of the practice of library history.[5] These various positions call for library historians to present their empirical studies in a broader context of relevance while keeping their focus on a life cycle of "collections of recorded knowledge … in the context of cultural and social history" [2, p. 173]. Library history needs to extend its scope, methods, and relevance to the field of library and information science as well as to its accountability as an interdisciplinary historical field.

By focusing on the history of the emergence of a specific digital library system, this study explores the concerns of library history as a field of scholarship in two ways:

1. methodologically—by applying a combination of document analysis and semi-structured interview to produce a history of digital library development during the initial digital library boom from 1998 to 2000 [7]

2. theoretically—through implicit engagement of theoretical approaches of modernization theory and cultural analysis as well as the theory of institutional change in a structured organizational field

Rather than focusing on the history of technology, it addresses the transformation of a field focused primarily on cultural production. As a historiographic account, it explores an immediate past from the point of view of the experience of participants in the process. Thus, the researcher assumes an interpretivist and a constructivist position in studying social change, empowering the views of those who were enmeshed with the process.

The conceptual framework for such an approach—to explain the appropriation and shaping of technology in terms of relevant social groups—can be found in the social constructionism as established in the phenomenology of Peter Berger and as developed in the social construction of technology approach (SCOT) [8] applied to the evaluation of digital library technology [9]. The development of a digital library system (the NDLP at the Library of Congress) can be seen as the process of negotiation of meaning of a socio-

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[5] The need for American library history to focus on the study of the "library in the life of the user," "the library as place," and the central role of reading are at the core of this paradigm. Library users become participants in the public sphere; the institutional setting is an agency for constructing meaning in their daily lives [5, pp. 4, 9-10]. The response to this editorial by five leading library educators was published in *Library Journal* [6], indicating that critical theory (and the study of information use from the epistemology

technical phenomenon by developers and policy makers. Accordingly, the development of a "technology artifact" has an outcome of *closure* and *stabilization* of meaning about that artifact (for the *relevant social groups* involved in the negotiation of meaning about this technology) during the five-year period of its development (1995-2000) considered here. At the end of the process, the *redefinition of the problem* of the digital library system is integral to the *closure mechanism* [10; quoted in 11, p. 353]. Invention is studied in terms of a cycle of development and not as isolated events; as processes that are determined by certain landmark transitions which can be characterized as stabilization / closure and redefinition of the problem as part of that closure mechanism.

This history of the digital library as a nascent socio-technical artifact aims to introduce the "technology" perspective in library history studies. As history, it is phenomenological because its primary focus is not the existence of an ontological reality, of a "real" world, but it does recognize that there is a historical reality for the participants and that they operate toward a consensus. Referring to the epistemologies of constructivist approaches as rooted in particular interpretive communities, Schwandt invokes Stanley Fish in stating that reality is the "result of the social processes accepted as normal in a specific context, and knowledge claims are intelligible and debatable only within a particular context or community" [12, p. 241]. Therefore, a phenomenological study capturing the experiences of interpretive communities (or relevant social groups in SCOT terminology) becomes crucial in supporting a constructivist approach in the study of the digital library as an emergent phenomenon. Institutionalization processes are another important component of this study. Understanding them has implications for practitioners and managers who are managing organizational transformation and the complex dynamics of innovation in the library context. The baseline account proceeds from establishing a chronology of the NDLP at the Library of Congress between 1995 and the time of the interviews, a year and a half after the official completion of the project.

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of the "quotidien" (the everyday life)), the historical and constructivist approaches still maintain a controversial if not marginal status in LIS field.

LIBRARY HISTORY FROM A TECHNOLOGY PERSPECTIVE: RELEVANT THEORIES

The theoretical framework for this endeavor blends the sociology of culture with social constructivism because it aims to understand how social change and innovation are related to theories of isomorphism (simultaneous change across institutions or in different parts of organizations or organizational fields) and institutionalization; and how technology artifacts become boundary objects for different groups to negotiate meaning. The theory of institutionalization and innovation in organizational fields [13-14]; the interpretivist approaches to technology, science, and innovation [11, 8]; the role of narrative in historical epistemology [15-18]; and the social constructivist approach [19] are the frameworks for analysis. This theoretical framework provided access to the processes of organization and innovation while acknowledging the perspectives and experiences of those involved, and connected them to social processes at macro- and micro-levels.

Institutional Change and the Sociology of Culture

Digital library development represents an emerging area of institutional operation that enables integration of electronic resources into routine library activities. Technological innovation implies a high degree of uncertainty in the context of operations and the organizational field of librarianship. The explanatory model for such process needs to account for societal pressures and self-directed change. Paul DiMaggio and Walter Powell [14] suggest a framework that enables one to consider innovation and organization in a broader social context while explaining change in the local environment. They claim that organizational change is driven by three different mechanisms (of isomorphism) that define how organizations behave with regard to innovation and institutionalization:

- *coercive isomorphism* results from coercive authority "from other organizations upon which they are dependent and by cultural expectations in the society within which organizations function" [14, p. 150]
- *mimetic processes* result from symbolic uncertainty in the environment and organizational response to that uncertainty; operants engage in problemistic search

that may have a ritual aspect when companies adopt innovations to enhance legitimacy, and to demonstrate that they are improving efficiency [14, p. 151]

- *normative pressures* are exerted by the requirements of professionalization and the cognitive authority of the organizational field [14, p. 152]

The Library of Congress embarked on a process of digitization, launching the NDLP in 1995, that resembled all three mechanisms of transformation. Different levels identified by DiMaggio and Powell present loci of control through which libraries, library professionals, and society interact in the process of innovation prompted in the context of a "digital library" initiative with a given beginning and end. For example, coercive isomorphism can be seen in the Library of Congress' responding to the congressional mandate to develop a base of digital images focusing on American heritage for the National Digital Library. The NDLP project was a pilot project "which had a goal of 5 million items in 5 years" (P4).[6] Secondly, the availability of technologies (notably, the emergence of the Web in 1994) enabled experimentation and technological innovation to create new services and products to increase institutional efficiency, which in itself has high legitimacy in the field of librarianship. In other words, "technology is there, and therefore we use it" (P2). This reflects the mimetic processes underlying the emergence of the digital library. Normative pressures are exerted through cognitive authority in the organizational field of librarianship that promotes digitization as a technologically progressive activity, and through self-perception as a leader in the field. In the words of one of the project leaders, the decision to "do American Memory before www caught on" (P1) was articulated as early as 1989.

Experimenting with methods of creation, organization, utilization, and preservation of collections by applying digital and networking technology defined the emerging area of institutional operation of digital librarianship. This process required the adaptation of technology to institutional goals, but also propelled institutional change and change in the organizational field of librarianship. Digital librarianship is a field "characterized by a high degree of uncertainty, [and] new entrants in the field, which could serve as sources of innovation and variation, [seeking] to overcome the liability of newness by imitating

[6] This is a reference to coded responses from the participants of this study who are subsequently identified as P1-P7 abbreviations ("P" for participant) as shown in Table 2.

established practices within the field" [14, p. 156]. Innovation processes will encounter resistance or attempts to conform to the legitimate (established) practices. This interaction provides a valuable insight into the process of social change in the organizational field of librarianship.

Social Construction of Technology (SCOT) as Social Construction of (the History of) a "Digital Library"

The adoption of technology (e.g., digital library development) and its adaptation in the institutional context (e.g., of the memory institution represented by the Library of Congress with its specific mission and communities of practice) can benefit from being considered through the social construction of technology framework (SCOT). The social construction of technology approach debunks an image of technology as a mere thing (tool, tangible outcome, mere instrument), and introduces the notion of technology as a socio-technical artifact. Technology therefore exists in the world of objects, processes, knowledge, and symbols [8]; it is of the material world as much as it is of semiotic construction; it is in the realm of engineering as much as of cultural interpretation. Examples of constructivist theories applied to specific technological developments from the sociology of ubiquitous technological artifacts such as automobiles, doors, machines, studies of motion pictures, fluorescent lighting, individual technological artifacts ("life and a death of an aircraft"), to the invention of chemical substances and industrial material (e.g. steel) [20]. This approach includes case studies of "technological artifacts," policy studies (analyses of information policy context for scientific and technical information), and humanistic interpretations of science and technology. The constructivist turn—now also known as the STS (Science-Technology-Society) studies—made an impact in the 1970s and 1980s by highlighting the role of ethnography as a research method and establishing an awareness of professional scientific idealism [21-23]. As a means of forwarding basic moral criticisms of techno-science through the organized work of scientists and engineers and the STS studies, this movement can be traced to the 1950s. The field now refers to both scholarship and activism [24]. SCOT framework assumes the following:

- the notion of <u>technology as (utilitarian) knowledge</u> shaped through invention and adaptation through gradual adoption,

- the involvement of <u>social actors and the society at large in shaping that technology</u> and defining its social uses, and

- <u>a historical view of technology</u> as an iterative process of innovation

This intellectual approach blurs technology, technique, and culture, technology as thing and as process of cultural adaptation [25, p. 662]. Adopted by historians of technology in denial of crude empiricism and technological determinism, this approach fosters a "constructivist view of socio-technical development, stressing the possibilities and the constraints of change and choice in technology" [25, p. 663]. The key concepts in SCOT include:

- *relevant social groups* (all those individuals organized in a social framework around the socio-technical artifact who are involved in shaping it, from users to engineers)

- *interpretative flexibility* (semantic variation around definitions of technology by different social groups)

- *technological frames* (or purposive interpretations by different groups that provide a semantic frame for the specific use of that technology that may not coincide with another group's use, such as the distinction between the use of digital libraries for preservation or for access to digitized materials)

- *stabilization* and *closure* (stages in the process of adoption and adaptation)

- *semiotic power* (the ability of particular meaning of a technological artifact to emerge as one that has credibility, thus attracting new social groups sharing that idea)

Understanding the variability of what constitutes a "digital library" as an emergent technology needs to take into account the experience and interpretive frameworks of *relevant social groups* (individuals) who shape the process of development. Recognition of *technological frames* calls for the identification of the multiple conceptions of a digital library and *interpretative flexibility* around that concept. Power relationships are integral to the process because of an ability of some groups to have more power because they are the "only one capable of directly modifying technology" [9, p. 67]. Mediation and level of influence refer to the ability to mold technology, or to offer resistance in a particular organizational setting because of their proximity to technology. The *socially relevant*

groups represent different divisions that are professionally or organizationally defined. They might range from different dualities such as librarians / technologists, visionaries / pragmatists, humanists / technological determinists, project staff / curatorial staff, and extend to members of particular power blocs representing different parts of the organization. For example, one may identify power blocs that shape *technological frames* to be represented by actual organizational units (i.e., divisions at the Library of Congress).

   Social groups by necessity of their interests hold different ideological positions about technology and innovation in an institutional setting. The high interpretative flexibility (discourse and negotiation) regarding the emergence of the digital library, its purposes and use, expressed by the protagonists involved with the project, prevents *stabilization* and *closure*. As a result, the emergence of the digital library prototype in 2000 is a socially constructed image of a digital library. It reflects the institutional transformation as seen from the vantage point of its developers, but it is also the first stage of development and *stabilization* through which the problem is redefined and *partial closure* established.

"Telling Stories" of Digital Library Development: The Problem of Historical Representation and Private vs. Public History

The methodological problems of constructivist historical narratives reflect dilemmas about the limitations of memory and the transmission of personal memories, and their tendency to be shaped by personal interest. Informal history enables expression that can bring power relations into focus; experience perspective thus becomes part of social inquiry. In a historical study, questions arise as to who speaks for history; why these voices are privileged in the telling; of whether the voices the researcher reveals are the voices that speak, and are they truly the voices of relevant social groups in the SCOT framework? These issues are as relevant in an interpretivist approach (SCOT) as they are for ethnography as history [26]. The question will remain of whether what is being revealed is personal or public history. This study does not ignore such concerns, and it aims to address them through recourse to identifying the loci of control of isomorphic processes that are operating upon these individual actors. This subjectivity as driven by

social forces may seem deterministic, though the other extreme would favor subjectivity of experience amounting to a hermeneutic requirement in interpretation. That would be a limitation for this and any interpretive history that depends on a recollection of personal narrative that conveys a **version of what happened**. Constructing the past is not the pursuit of a referent and neither are the stories about the past arbitrary subjective renditions; the stories refer to a "happened" past but examined from different vantage points. In this particular case, the participants in the study as protagonists of the immediate past provide explication of their experience as they create narratives "construed within their particular episteme" [17, p. 144]. Their episteme is determined by their roles and membership in a community of practice or in relevant social groups involved in shaping technology. The methodological implications for analysis are that the historian is justified in treating the past "at its most basic cultural level, that is, at the level of narrative" [17, p. 145] and that the historian is presenting a history of the project as a study of processes with a historical perspective. Most of the protagonists whose interviews are used in this study are also authors of the extensive technical documentation about the NDLP published at the project website and in other technical reports and professional publications. Thus, these individuals exerted semiotic power in producing a tangible historical record about the project – its official history. Many volumes and a large commentary of best practices are built into that technical documentation and need to be analyzed in relation to the interviews. This study focuses on what respondents related about the project rather than on the documentation itself. It offers an inside point of view but, strictly speaking, as historical narrative the documents present fabricated history open to interpretation because the "real" history is still in the making at the time of the interviews.

"FIVE MILLION IMAGES IN FIVE YEARS": THE NATIONAL DIGITAL LIBRARY PROGRAM OF THE LIBRARY OF CONGRESS, 1995-2000

> For the general public, the Congress has endorsed the creation of a
> National Digital Library through a private-public partnership that will
> create high-quality content in electronic form and thereby provide remote
> access to the most interesting and educationally valuable core of the
> Library's Americana collections. Schools, libraries, and homes will have
> access to new and important material in their own localities along with the

same freedom readers have always had within public reading rooms to
interpret, rearrange, and use the material for their own individual needs.
(JAMES BILLINGTON, Librarian of Congress,
fall 1995 [27])

The signing of the National Digital Library Federation Agreement on May 1, 1995, officially brought into existence the NDL Program at the Library of Congress [28]. James Billington's statement articulates its vision. Since then, the American Memory site (AM) has grown into the popular icon of the National Digital Library Program (NDLP) at the Library of Congress.

The digitized media brought about improved access to the collections and new uses for these collections and established prominence for the Library of Congress in the public imagination as the repository of "the nation's memory." The following statement captures this effect fully: "already, the Library of Congress is finding that more people visit their 'American Memory' site online than visit the library building on any given day" [29]. At the time of writing this paper, the AM home page presented the collection as the "gateway to rich primary source materials relating to the history and culture of the United States ... [with] more than seven million digital items from more than 100 historical collections." [30]. This statement envisions a new environment for the creation, distribution, and circulation of knowledge, continuing the online revolution in libraries that started with the establishment of the Ohio College Library Center (OCLC) in 1967, another global force for providing access to information. The ideal of an active rather than a passive library is a guiding principle of the NDLP at the Library of Congress. Speaking about the impetus for the founding of OCLC in his 1993 address to the Newcomen Society of the United States, K. Wayne Smith, the third president OCLC Online Computer Library Center, Inc. states that it was a "vision of a new computerized library [that] would be active rather than passive, that people would no longer go to the library, but that the library would go to the people" [31, p. 8]. The development of AM as the most visible outcome of the NDLP for the American public maintains this vision of the role of technological innovation in the library context. The factual history of the emergence of the NDLP at the Library of Congress based on the official (public) statements and documents is presented next to provide a basis for presenting the phenomenological framework for studying this transformative event.

Chronology

The statement by the Librarian of Congress given earlier [27] accompanies the official launching of the NDLP at the Library of Congress in 1995. The Internet Archive web archive [32] provides another insight into that process, interesting for a historian. The earliest record of the Library of Congress home page (from November 20, 1997) in the Internet Archive[7] shows AM featured at a prominent location at the top of the page.[8] A brief annotation explains AM as: "Documents, photographs, movies, and sound recordings that tell America's story."[9] Although the earliest record of the American Memory site in the Internet Archive dates from January 1999,[10] we know that AM as a program of digitization of historical collections dates from nearly a decade earlier.

   Developing Prototypes (1990-1995). The AM began in 1990 as a pilot project to prepare electronic versions of Library of Congress collections for national dissemination; the first full prototypes were evolved in 1991 and 1992 [33, Ch. 1]. From the beginning, the Library was exploring the possibility of online distribution via the Internet [33, Ch. 1]. Ten American Memory collections were released between fall 1991 and fall 1992 (prepared for IBM and Macintosh platforms).[11] These prototypes were tested in a two-

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[7] All searches are done using the Wayback Machine search engine at the Internet Archive site (http://www.archive.org).

[8] The search on "http://loc.gov" retrieved 326 manifestations of the Library of Congress website home page and 41 transformations of the page between June 1997 and November 2003 (http://web.archive.org/web/19971211121147/http://www.loc.gov; accessed November 24, 2003). Searches in the Internet Archive (http://web.archive.org) are limited in several ways. The search retrieves transformations of a site identifiable through a universal resource locator. If the site has been maintained at different servers, the search would need to trace each of them separately. Another limitation is time, with 1996 as the low cutoff date. For a number of recorded sites, information is not available. This archive is not unlike the traditional paper archive in having a historian face the problem of missing evidence.

[9] This version also includes "The Learning Page," the featured collection, and "Today in History."

[10] The page is available at: http://web.archive.org/web/19990125090846/http://memory.loc.gov; accessed November 24, 2003. The searches were performed on all known uniform resource locators for "American Memory" site: "http://memory.loc.gov," "http://loc.gov/ammem" and "http://lcweb2.loc.gov/ammem."

[11] These collections include: Color Photographs from the Farm Security Administration and the Office of War Information, ca. 1938-1944 (Fall 1991); Last Days of President McKinley: Paper

year field study (1991-1993) on a core audience represented by the users of 40 libraries in a variety of settings. The results of that survey [33] represent one of the earliest records of activities leading to the development of the National Digital Library Program as a concept and the American Memory as a tangible manifestation of that idea. The pilot was concluded in 1995, with the following outcomes: it "identified the audiences for digital collections, established technical procedures, wrestled with intellectual property issues, demonstrated options for distribution and began institutionalizing a digital effort at the Library of Congress" [34].

The NDLP Era (1995-2000). As a component of the NDLP, the AM included this program's historical collections. In 1995, when the official signing of the documents by the Librarian of Congress launched the Program at the Library of Congress into existence, the AM project was in its fifth year. More than 210,000 items were successfully digitized; these items were available at 44 test sites around the United States [35, p. 66]. The goal of the phase of the project initiated in 1995 and institutionalized as the NDLP was synergistic. It aimed to build a critical mass of five million images by the year 2000, creating a core database of U.S. history and culture for the future National Digital Library [35, p. 66]. Focusing on the American historical collections, digitized because of their unique nature, and exploring the instructional uses of the collections, this early program built on work that started in the Prints & Photographs Division and the Geography and Maps Division [36].

This stage built on the existing resources in digitization efforts predating the World Wide Web, namely the Library's Optical Disk Pilot Program initiated in 1982 (as described by Elisabeth Betz Parker) [37] when the Prints & Photographs Division

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Print Films of President William McKinley and the Pan-American Exposition, 1901 (Fall 1991); The Nation's Forum: Early Sound Recordings of America's Leaders, 1918-1920 (Fall 1991); Photographs by William H. Jackson and the Detroit Publishing Company, ca. 1880-1920 (Fall 1991); Political Prints and Cartoons about Congress, 1770-1981 (Fall 1991); World's Transportation Commission Photographs, 1894 (Fall 1991); Documents of the Continental Congress and the Constitutional Convention, ca. 1774-1790 (Spring 1992); The Life of a City: Early Films of New York, 1898-1906 (Spring 1992); Selected Civil War Photographs from the Library of Congress, 1861-1865 (Fall 1992); African-American Pamphlets from the Daniel A. P. Murray Collection, 1820-1920 (Fall 1993) [33].

"started reproducing selected collections electronically (initially on videodisc) and cataloging the images for the Library's Optical Disk Program" [36]. In 1996, "an array of videodisc players and a separate monitor for displaying images … introduced as a public service in the reading room and dubbed the One-Box" were the direct outcome of that initiative [36], to become a gateway to the Prints & Photographs collections released on the Internet in December 1998 as PPOC (Prints & Photographs Online Catalog). Building the national information infrastructure continues from the early attempts to employ electronic media for preservation and small-scale projects, through the American Memory Pilot project, the American Memory, the National Digital Library Program (NDLP), and finally the National Digital Information Infrastructure and Preservation Program (NDIIPP). In the 1999 report[12] to the President, the PITAC (President's Information Technology Advisory Committee) recommends continued and increased federal funding for the development of technologies for information access "aimed at transforming how the public will be able to deal with information, and supporting new ways of learning" [38, p. 1]. The report considers these technologies for information access "essential for achieving America's twenty-first century aspirations" [38, p. 1].

Post-NDLP Era (2000 to date). A focus on preserving digital context represented officially a new stage in the digital program for the Library of Congress at the time of the interviews (in July 2002). The U.S. Congress approved the plan for the National Digital Information Infrastructure and Preservation Program (NDIIPP) in December 2000 [39]. An initial $25 million for that program "will enable LC to launch the initial phase of building a national infrastructure for the collection and long-term preservation of digital content" including "scholarly journals, books, and magazines; CD-ROMs, digital photographs, music, and films; and other Internet material" [40, pp. 17, 20].

The factual history of development is a framework of events and landmarks that provides a referent and helps to situate the narratives and viewpoints of the innovators as participants of that process.

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[12] The sections on vision for "Transforming the Way We Deal With Information" and "Transforming the Way We Learn" lays out these goals specifically [38].

METHODOLOGICAL FRAMEWORK

Research Questions

The research questions posed in this study are:

- What are the modalities of a successful innovation process?
- How can the characteristics of creative decision making be identified ex post facto?

The main research objective was to understand the process of developing a digital library system and to see how the nature of that innovation is assessed from the point of view of those involved with that development at a closure point of that process.

The secondary research objectives are shown in Table 1. (The table shows each of the objectives in relation to the data collection tool and theoretical framework.) The individual decision makers and structure (innovation process in relation to internal and external environment) were considered as variables shaping the process of technological transformation.

Table 1. Research Objectives and Interview Questions in Relation to Theoretical Frames

Research Objectives	Interview Questions	Loci of Control	Historical Frames	SCOT Framework
1 DESCRIBE the informants' self-perception of their roles, involvement with the project and career paths, mediation and involvement with other socially relevant groups	1-2	normative pressures (profession)	genesis	mediation
2 IDENTIFY formative events and project landmarks as perceived by the protagonists	3, 4	mimetic processes (organization)	genesis to agency	interpretative flexibility cornerstone closure
3 DESCRIBE the organizational field, institutional processes—project and departmental, client relations of related institutions and with society at large	5-6,10,14	coercive isomorphism (society) mimetic processes (organization) normative pressures (profession)	agency	interpretative flexibility
4 IDENTIFY issues that provoke conflict: barriers, negotiation, and conflict resolutions	4, 11-13	mimetic processes (organization)	agency	stabilization & closure

NOTE: Social context imposes the loci of control in the process of institutionalization. These loci of control are exerted through regulative processes originating in the external environment, norms of behavior and moral codes of the communities of practice, and the power blocs in the institutional context [14]. Historical frames for digital library system development (NDLP) include genesis (emergence and developmental stages of the project), and agency (in the meaning of end or a means of control achieved, being in action, exerting power; effectuation, implementation). SCOT framework identifies the involvement of socially relevant groups in the social construction of technology. They are more or less mediated in regard to the proximity to technology and its interpretation. The questions (Q1-14) are reproduced in full in the Interview Guide, in the Appendix of the accompanying article, Part II (available as an electronic-only article in this issue).

The narrative accounts obtained in interviews with the developers and policy makers, the participants of the NDL at the Library of Congress, provided an inside view into that process and loci of control. Together, they provided an insight into the phenomenon under study. The interviewed individuals are performing certain roles in shaping the development of the digital library system and the narratives are part of that performance. The interviewed individuals are protagonists operating within an environment shaped by coercive isomorphism, mimetic processes, and normative pressures. They also are members of relevant social groups that shaped the innovative technology.

The transformation from beginning to end is one way to measure social change. The primary objective was to discover the developers' (discursive) engagement with the **emergence** (genesis) and **effectuation** (agency) and their assessment of the innovation process. The assumption was that this process is shaped by a number of forces. They include the social context defined through coercive isomorphism, mimetic processes, and normative pressures. To accomplish this goal, the protagonists' narratives were examined in relation to:

- Their institutional roles and self-perceptions
- How they identified formative events and project landmarks
- How they perceived the organizational field, institutional processes (project and departmental), client relations of related institutions, and society at large
- How they presented negotiation processes, barriers, conflict, and conflict resolution

In these secondary objectives, the experiences of development can be read from how the performers of a role describe these roles, how they identify (trans) formative events and project landmarks, how they position project activities within an organizational field and external loci of control, and in interpretation of conflict resolution themes. The analysis aims to understand how the protagonists defined the relationships in their environment and how they built historical narratives of that process.

Research Design

The analysis of the digital library development at the Library of Congress employed a combination of document analysis and semi-structured interviews with individuals

involved with the NDL project at its various stages. Documentary evidence included internally produced technical reports available on the AM site [30]; published reports in professional literature [37; 27; 36; 41]; evaluation and usability studies [42]; and external expert reports prepared at different stages of the project. Among them is the key report prepared at the conclusion of the pilot project in 2000 (also referred to as <u>LC 21: A Digital Strategy for the Library of Congress</u> [43]. All these documents can be identified as documenting best practices and therefore recording the workflow and what is known as tacit knowledge. They aided in establishing the chronology of events presented in an earlier section of this paper. Some of the informants were also producers of this extensive documentation.

Interviews provided an insight into the organizational process from within, from the perspective of the participants and their definitions of the emerging technology and understanding of that technology. The interviews also provided an insight into the development of a digital library system as socially constructed and evaluated technology through the perceptions of the participants engaged in its process of development; they also indicated power relationships and their co-existing, but not irreconcilable, insights into the past. The informants were selected among those that were closely involved with shaping the system. They were therefore the least mediated of the groups involved in the development and evaluation of the process (in SCOT framework) as opposed to more mediated groups of users, donors, and the general public. The responses were aggregated in the interpretation and the informants were identified by their roles (not by official job titles). Because of the focus on individual perception, quotes from the interviews are coded (P1-P7).

The Setting and the Study Participants

The study was conducted with former NDLP staff who were with the project for two years or longer. The interviews were conducted over two days at the Library of Congress, on July 15-16, 2002. At the time of the interviews, the pilot stage of the NDLP (1995-2000) was completed and some of the interviewees were either assigned to duties in other parts of the library, were finishing the projects that were part of the NDLP, or were

involved with post-NDLP restructuring programs. This study does not include all of the original staff of the NDLP, some of whom have since left the Library.[13]

Table 2: Involvement with the National Digital Library Program (NDLP) (N=7)

Participant codes	Function (LC & NDLP)	Length of involvement with NDLP (in years)	Roles (organization-related)	Roles (domain-related)	Roles (related to knowledge life cycle)
P1	administrator: planning activities; initiation of the project; overall coordination for non-print and AM; technical coordinator for preservation	5 + post-NDLP reorganization	core staff	content other (evaluation)	policy project management
P2	initiator of new projects; public service collections administrator	4 + post-NDLP reorganization	n/a	services other (evaluation)	policy utilization
P3	digital conversion specialist; individual project coordinator	2.5	core staff	content culture	project management
P4	digital projects coordinator for digital conversion activity; digital project coordinating team supporting multiple divisions	3 + post-NDLP reorganization	core staff	content	policy project management
P5	legal specialist for digital publishing rights licensing, purchasing copyright deposit; legal sufficiency/risk project overview	2	n/a	culture	policy
P6	NDLP reference service; help desk; outreach and education; editorial handbook	5	educational services staff	services	policy utilization
P7	architecture infrastructure (generalist); NDL competition coordinator	5	core staff infrastructure staff	technology content other (evaluation)	policy project management

NOTE: Two coding schemes are used to refer to the informants' roles in the NDLP. They are based on the existing schemes used in identifying the digital library staff. Planning documents of the NDLP (1995) [44] distinguish curatorial staff, core staff, infrastructure staff, and educational services staff. These categories identify different types of staff in terms of organizational setting (the library).

[13] For example, one of the key participants has since retired. In the project documentation, the names of other key personnel appear who have since left the library. For example, Suzanne Thorin, the Chief of Staff and Coordinator of the NDLP, and Laura Campbell, Director of the National Digital Library Program, are no longer with the project, which has recruited original participants of the project.

Another categorization identifies staff in terms of domains including content, services, technology, and culture, including a category of other (evaluation, impact) [45, s.v.].

  As shown in <u>Table 2</u>, the majority of the informants were with the NDLP for most of the duration of the project. The type of their involvement with the NDLP varied in responsibility level and scope. They also shifted their responsibilities over time. Among them were digital project team managers, coordinators, and administrators. Their institutional roles included core, educational services, and infrastructure staff. The curatorial staff as the fourth category identified by Laura Campbell in the NDLP planning document [44] was not represented in this group. [14] When categorized by domains of activity, [15] according to another early scheme [45], the study participants represent staff primarily involved with content (production) (four), followed by evaluation/impact of the digital library (three), services (reference) (two), culture (including copyright and rights management) (two) and technology (one). They often combined two or three roles (four

[14] The description of each category from a 1995 planning document [44] is quoted here: **Curatorial staff**—assigned to the curatorial divisions—prepare and process materials to be digitized; they also perform on-site digitization materials that include rare and fragile items such as early drafts of the Declaration of Independence and the Gettysburg Address. NDL Program **core staff** work with the Library's divisions to prepare and describe the collections, verify the status of copyright and seek permission for use of the materials when appropriate, digitize the materials and verify that they adhere to the Library of Congress's standards of quality. Digital conversion specialists in the central office provide project coordination and technical oversight. The more experienced specialists oversee collection development and production, serving as team leaders and as brokers among the division and automation staff and contractors. **Infrastructure Staff** are primarily information systems experts who build and maintain the automated systems that store and provide access to the digital collections. These are the staff who must unscramble and make useful the world of the Internet. The **educational services staff** focus on educational outreach for the use of the historical collections by the K-12 community. They research user needs, talk to the education communities, evaluate technologies for delivery of digitized materials, coordinate collection selection, and develop and supervise contracts.

[15] **Content** (integration of multimedia objects; data acquisition, including analog to digital conversion; metadata extraction and standardization; indexing, storage, and retrieval; workflow processes and management; and collection preservation and maintenance). **Services** (user interfaces: search, filtering and browsing; reference and question answering; and instruction). **Technology** (high-speed networking, security and billing, and interoperability across many DLs). **Culture** (intellectual property; insuring data quality, privacy, and equity; and organizational interfaces for various communities of practice). **Other** (meta issues related to managing and evaluating DLs and their impact on people and organizations) [45].

participants). From the knowledge life-cycle point of view (policy, project management, utilization), the roles of the participants ranged from involvement with policy (six participants), to project management (production, organization, preservation) (three participants), and utilization (usability) (two participants). These roles merged due to the requirements of their positions.

The two questions in the interview asked the respondents to introduce themselves briefly in terms of their background, work experience, and position in the institution, and asked them to describe their involvement with the digital library initiative at their institutions. These self-defined roles were also taken into consideration; the career narratives and description of the role in the digital library project provided a rich resource for an analysis of the loci of control and the individual reasoning in Part II of this article. These individuals experienced the project relative to their positions in the organization and in terms of the social context (coercive isomorphism, mimetic processes, and normative pressures), project life cycle, and involvement with the project. Given the variability of their roles in the digital library development, they were an ideal group with whom to study the social construction of the digital library system. Curatorial staff—although directly involved with the development—are not represented here, partly because the recruitment of informants was directed to the digital library core staff.

Data Collection

Data collection was conducted through semi-structured interviews organized around 14 open-ended questions.[16] The questions touched on a variety of themes, including the informants' involvement with the digital library development, the history of the initiative at the Library of Congress, their experience with specific projects, and their awareness of collection development policies and of the novel uses of collections. These questions form the basis for data analysis and findings. Because of the semi-structured interview format, the informants free-associated and compounded issues from several different questions. The data analysis allowed for certain topics to emerge. Based on grounded theory approach [46], the analysis entailed selective coding that helped themes to emerge apart from the interview questions. The interpretive style followed a critical theory

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[16] Later in this text, Q1-Q14 refers to the questions of the Interview Guide (reproduced in full in the Appendix of the accompanying article, Part II (available as an electronic-only article in this issue)).

approach, giving primacy to interviewees' experience and to their expression of emotionality. Data reduction and interpretation aimed to present interpretative flexibility of the participants in the social construction of the digital library system.

While the informants reflected on the initiation of the digital library program, they also reasoned about its course of development, the crises and successes encountered, and the internal and external forces that organized the process. They expressed a sense of purpose that the process held for them. Reflections on the beginnings and development (genesis) and the effectuation of the project (agency) are intertwined in these records. This history—merged and contrasted from individual histories (accounts)—is a personal one because it focuses on people as they make meaning of events. Thus, it studies history as culture.

Reporting on the "sentiment surrounding history as a living story that speaks of the tension between past and present" [18, pp. 240-241], history can be seen as socially constructed knowledge observable through situated interchanges among people rather than as an objective external reality [19, p. 267]. The focus is on contrasting multiple viewpoints. Taken together, these accounts are more than stories of lived experience; they amount to a historical narrative socially constructed by the participants in a community of practice [47], about a phenomenon that has not yet reached an interpretive closure. The participants engaged in the common activity of developing digital library technology belong to the organizational field of digital librarianship and are likely to represent the more general concerns experienced by that emerging organizational field.

The Interview Process

The informants were asked to introduce themselves in terms of their background, work experience, and position in the institution (Q1); and to describe their involvement with the digital library initiative at their institution (Q2). This prompted participants to identify with the different communities of practice, present their career narratives and their history of involvement with the digital library system, and the transformation of their roles in the organizational context. In this way, they revealed their position in the field of normative pressures of the profession and cognitive authority of the organizational field. They also established their connection to relevant social groups in the institutional context and level of mediation in shaping technology. Later, participants were also asked

to identify the different communities of practice in their institutions; they were asked to reflect on the effects of the broader social environment in shaping new technology and negotiation processes (Q10).

The informants were then asked to identify the key stages of development (Q3). This enabled tapping into their perception of transformation processes, identifying formative events and project landmarks to establish a subjective chronology of the digital library development. Next, they were prompted to think about their experience of the process (Q4), reflecting on the mimetic processes prompted by symbolic uncertainty in the environment and in organizational response, and how they implemented their goal of improving efficiency.

When participants were prompted to identify the uniqueness of the process in their institution further in the interview (Q5, 14), this enabled them to reflect on the coercive authority from other organizations and cultural expectations in society (coercive isomorphism) as well as the normative pressures of the professional and cognitive authority of the field. This also aimed to judge the level of these informants' engagement with these broader environments that shape innovation and emergent knowledge and the awareness of their institutional efforts in that broader context.

The participants were also asked to reflect on the nature of innovation and the impact of technology on knowledge production in the context of memory institutions. They were asked to compare the "new" and the "traditional" collection development strategies (Q6). They were prompted to identify the outcomes of innovation in identifying new uses of the collections as a result of the development of the digital library system (Q8); and to reflect on how external factors are affecting innovation and exerting pressure on institutional processes (Q7, 9).

In the comparison of the two projects that the informants were most familiar with (Q11), they reflected on model resolutions of symbolic uncertainty, problemistic search, crises, and resolutions (Q13). Critical incident approach was used to identify crisis points in the history of the building of each of the projects and of the negotiation processes (Q12). These narratives present a record of interpretative flexibility as relevant social groups move from uncertainty to closure in the social construction of technology. The expectation was that the successful projects are likely to move toward closure. Reaching

closure involves alignment with the external pressures of social and cultural norms that the new technology needs to conform to (coercive isomorphism), as well as organizational change, from symbolic certainty surrounding innovation to institutionalization of innovation (mimetic processes). The intention was to capture the participants' experience and negotiation strategies and their assessment of closure (success).

The connections between the secondary research objectives that prompt the research questions and the connections of the research objectives to the interview questions and the theoretical framework (institutionalization, historical frames, and social construction of technology approach) are shown in Table 1.

THE SUMMARY OF FINDINGS WITH IMPLICATIONS FOR PRACTICE

What was learned from the informants' perception of how a digital library emerged and what the theory revealed about the forces of acceleration of innovation in the institutional context are summarized in points focusing on technology, transformation, and personnel. These points have implications for the developers of digital libraries in understanding how institutions can absorb transformational forces. Since the analysis and data are presented in the accompanying article, Part II (available as an electronic-only article in this issue), only general observations are included here.

Technology. The basic premise of DL innovation is that it involves the use of technology and that resolving technological obstacles in moving collections online is central to DL system development. As interviews have shown, technology is secondary. The primary questions are the purpose of the collections and the dichotomy between access and preservation. Making collections digitally accessible diminishes stress on physical resources but it changes the role of a person who controls access, thus introducing stress on organizational processes, and prompting a redefinition of the roles of the gatekeepers. It was surprising to see that the battle was not about technology but about pushing the organization into a digitization framework.

Transformation. One of the key themes in this study is organizational transformation (converting all segments of the organization "to the love of the digital" as one of the informants put it). In the organizational setting described here, people from

different fields were involved with the process of digital conversion, while librarians became involved at the end of that process. Libraries respond to changes of information environment; as caretakers of information artifacts, librarians define their roles in relation to the changing nature of information objects. The technological shift is partly directed by and partly imposed upon the libraries, as shown here. In the process of innovation, the "old library" which stands for a politics of access and institutional processes, shifted its ideologies and practices of access.

The transformative forces in the library for the duration of the NDLP (1995-2000) rallied around the statement, "5 million images in 5 years" as a goal of digitization. Measuring progress in quantitative terms provided a clear sense of what a successful outcome would be, and whether it has been achieved or not. In contrast to the ideological discourses of access and preservation, such a non-ideological goal is not one on which it would be possible to disagree; it was a goal that could be disengaged from any other goal that diminished negotiation between the different parts of the organization and the organizational field of librarianship. This simple concept ultimately served to assimilate, incorporate, and standardize differences within the organization as it brought about a fundamental shift of moving digitization from the periphery to the center ("everything is digital now"). That has been an actual outcome of the NDLP. As the views of the participants in this study have shown, there were obvious undercurrents of a cultural debate about the usability of the collections, and of the access vs. preservation approach, but these debates became primary only in the aftermath of the project itself. The cultural processes didn't get fully engaged at the time of creation because of the simplicity of the goal. It was surprising that librarianship as an organizational field had comparably less impact on that transformation than had external forces: the impetus for the project came from outside the organization. Money mattered as well, as can be seen when the production mantra was invoked as innovators encountered obstacles. The simple assessment of whether a collection could help achieve a quota was used, thus making the process of what to digitize and what not to digitize opportunistic. The implication for practice is that it is important to find a simple theme encompassing a clear goal that can then be assessed in terms of an exact outcome.

Personnel. An eclectic group of people made up the staff of the NDLP and was charged with the task of creating new processes and new organization. Being from a variety of backgrounds, they were not aligned with the existing blocs (in terms of professional values) but saw themselves as performing translation work. They measured their own success in terms of the production mantra of "5 million images in 5 years." When they encountered obstacles, this mantra allowed them to remain neutral and unaligned with any particular view within the organization. This finding has a practical application in pointing to the usefulness of digitization teams consisting of people from diverse fields who have in their experience been accustomed to crossing boundaries. They need to have a clear allegiance to a particular goal (here it is loyalty to the "love of the digital") that represents the larger coercive force. These individuals agreed with librarians on multiple levels but their activity was not constrained by existing models of practice. While the models of access based on the existing practice of librarianship may be more sophisticated, these models were not effective in supporting the goal of digitization.

GENERALIZABILITY OF FINDINGS AND IMPLICATIONS FOR SCHOLARSHIP

In this research design generalizability is limited because qualitative research "does not have an intent of generalizing findings but to form a unique interpretation of events" (Creswell, 159). It is customary in such cases to state that generalizability of findings could be attempted through studies of similar projects. This allows for the incremental construction of a knowledge base related to the online revolution in libraries of the past thirty years, the comparison of these technological stages and theory building. The formation of OCLC in 1967 can be revisited as one such significant innovative event. From the existing studies [48-52], contemporary sources, and oral history, SCOT framework could be used to reconstruct the relevant social groups and analyze the historical emergence and contemporary reception of OCLC. The study presented here can provide a blueprint for analysis.

Within limitations of qualitative design, meta-findings ("generalizations") can be identified in relation to the initial research question about the modalities of the successful innovation process (the second question was the demonstration of the method). Because

they are derived through data aggregation from the interviews, they need to be considered in light of analysis of qualitative data presented in the accompanying article, Part II (available as an electronic-only article in this issue).

An earlier study of decision-making groups contrasts creative strategies (decisions that break out of the mold and select innovative alternatives) and strategies that focus on incremental change to "satisfice" within acceptable limits [49, p. 44]. The study of the NDLP also shows the importance of that variable. The innovators were likely to adopt creative strategies because they considered themselves distinct from the environment (library). The innovators literally overlooked the possibility of incremental change (satisficing) as they worked within a set agenda determined by information policy (determined by the Congress). In this study, the pressures of the organization, and the norms of the profession have low impact on their decisions. It would appear that it is important to create such structural rift in the organization to enable creative decision making. A decision group needs to fit the creative strategy (the long-term objectives) and does not operate within current policies aimed at resolving problems at hand [49, p. 44]. This is the second meta-finding about the modalities of innovation. Although there was evidence that there was some dissatisfaction with present procedures in some parts of the library (some divisions at the Library of Congress) that brought about recognition that change was needed and digitization would facilitate information handling, this was not the main impetus for innovation. Structural features of the organization imposed objectives, time pressures, and allocation of resources to an innovation. The communication structure enabled creative decision-making strategies, with innovators being able to work across existing communication boundaries for the duration of the project. This is the third meta-finding of this study. These meta-findings address the hypotheses of an earlier study on innovation decision making comparing the work of two Committees of Librarians (active in 1963-1965 and 1965/1966 respectively) in terms of propensity for innovation that brought about the formation of OCLC in 1967 [49].

It was stated at the beginning that this study aims to revisit the debate about library history scholarship from the perspective of technological change. Phenomenology is the approach used here to study the modalities of digital library emergence as experience of social change by those who were participants and agents of that transformation. This

stance reinforces the argument that library history needs to include the theoretical approaches and methods of other fields to understand the processes of knowledge creation, circulation, and use in the institutional context.

The building of a DL system in the context of a national library (Library of Congress) is seen as a process of social change. The sociology of culture and the social construction of technology frameworks provided the explicit theoretical bases for this study. The innovators (builders of the DL system) provided an empirical insight into relations between society and an organization (Library of Congress); isomorphic processes within different parts of the organization; and processes within the organizational field (professional practice of librarianship). Semi-structured interviews with representative members of the NDLP team aided in understanding the negotiation of meanings and identification of critical issues in the process of institutionalization of the DL system. These narratives provide evidence of how organizational change is perceived by those who are responsible for generating that change (i.e., innovators as operants). As outsiders to the field of traditional librarianship, the innovators responded to pressures from other organizations and the cultural expectations of society (coercive isomorphism) and normative pressures of the professional field. These forces determined the course of the adoption process. The study demonstrates that the engine of organizational rationalization works through integrative forces that emerge around technological innovation through the agency of innovators, quickening through the integrative processes in the organization and negotiation of meanings of the technological invention. Thus, shifts in organizational rationalization are directed through the agency of innovators and of society at large, but organizations have a powerful role in defining that process and bringing about homogenization within their fields.

The assessment of the flow of innovation within the organization, as perceived by the DL system developers, concludes with the emergent realization that there is a changing paradigm of the collections that will have an impact in redefining the technological frame of the DL in the next stage of development (post-NDLP) and that the larger degree of inclusion of users in the emerging technological frame for the DL system may be a key ingredient of that process.

Although the NDLP phase of development (1995-2000) officially ended, the innovators did not achieve an accompanying sense of semantic closure. They recognized the heterogeneity and open-ended nature of the process of development and thus confirming the hypotheses about isomorphism as a homogenizing force when invention circulates from one direction to the other [14]. As emphasized, integrative processes and the effect of external isomorphism (of the society upon the organization) will be shaped by the new uses of the collections to which the "old library" (with its established professional practices not yet integrating the technological innovation) needs to respond. In terms of the organization itself (Library of Congress), the process of the integration of the "new library" (the DL system) and the "old library" had just begun in 2002.

The informants (DL system development staff) experienced the emergence of the NDLP as a response to coercive isomorphism (authority from other organizations such as Congress, donors, and the cultural expectations of society). These forces determined the NDLP goals and priorities and initiated the course of adoption of the emerging DL technology in the library system. As they described the response to the NDLP in other parts of the organization, they referred to two issues: (1) integration of project activities with activities of the standing divisions in the Library for the duration of the project, and (2) integration of digitization activities in the Library. They concluded that one of the outcomes of the five-year project is a transformation of organizational culture. There is also the recognition that the emerging technological frame for the new collections is an open-ended process (of re-definition of the collection/document, and access/use) and an overall shift from preservation to access in defining the DL technology. Because of the dominant role of the Library of Congress in resource centralization and professional practice, this process is significant in the broad organizational field in which the adoption of DL system as a new technology of access and use of information is a central concern.

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