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Theory of Information and Communication

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7.2 Libraries, Archives, and Museums (LAM) in the Digital Environment

Libraries, archives, and museums (LAM)

Throughout their millennia of history, libraries have developed an evolving concept, adapted to the characteristics and needs of each era. This concept is neither universal nor immutable, as it has responded to changes in documentary formats and access to knowledge. For centuries, libraries focused on the conservation and organization of books and other materials in analog formats, whereas today, their focus has shifted toward access to information and the management of digital content. These transformations reflect the ability of libraries to redefine their organizational and functional nature, solidifying their role as fundamental spaces for knowledge and information access.

Libraries, as institutions dedicated to preserving and providing access to knowledge, have evolved significantly. Originally, they focused on collecting documents such as tablets, scrolls, codices, and manuscripts. With the invention of the printing press, the concept of the library became primarily associated with the preservation and lending of printed materials, such as books and periodicals. However, their scope expanded to include other media, such as music recordings and films, eventually leading to the predominance of electronic formats today. This shift from physical to digital has altered the way libraries manage their collections and services, adapting to an environment where both unique and replicated publications coexist in a global, interconnected framework (Rasmussen & Hjørland, 2023).

According to Linares (2009), essentially, every library consists of three key elements: a collection or documentary fund, technical processes, and informational services. The collection represents the set of documents available to users, while the technical processes—such as representation, organization, and document retrieval—ensure that these documents are managed with scientific criteria. Finally, library services facilitate user access and interaction with the documentary fund, thus fulfilling their essential purpose of promoting knowledge and the dissemination of information.

Archives have played a crucial role in organizing and functioning within societies throughout history. In ancient Egypt, they were fundamental pillars of bureaucracy, managing written records with meticulous care, requiring a highly specialized administrative apparatus. During the Middle Ages, their role centered on reinforcing the power of authorities by documenting laws, resolving legal disputes, and maintaining social order, solidifying their importance in the governmental structure (Marty, 2007).

Starting in the 16th century, cabinets of curiosities began to emerge, blending art, ethnography, nature, and religious relics. Though considered precursors to modern museums, these cabinets shared similarities with libraries and archives in that they gathered and preserved valuable items. Unlike libraries, archives are not structured through universal classification systems; instead, they follow the principle of provenance, which holds that documents should be kept organized according to their origin to preserve their context (Rasmussen & Hjørland, 2023).

The archive, as an institution, plays a crucial role in organizing, preserving, and managing documents, ensuring their authenticity and truthfulness. This process is based on the standardization of documentary formats, ensuring the integrity of the information. Archives classify documents according to their functions, separating those for current use from those intended for reference or long-term preservation, following legal and administrative criteria. Furthermore, they determine which documents should be destroyed or preserved, establishing a balance between operational utility and historical value. As part of their functions, archives also disseminate information through publications, such as monthly bulletins and annual summaries detailing the development of transactions, extending their impact beyond their role as storage (Dorado & Mena, 2009).

In the case of museums, they are distinguished by their focus on collecting three-dimensional objects, known as "museum objects," which include both cultural products like clothing, furniture, paintings, musical instruments, and sculptures, as well as natural phenomena, including specimens of animals, minerals, and plants (Rasmussen & Hjørland, 2023). Unlike the documents of libraries and archives, museum objects are generally unique, with a strong emphasis on authenticity. However, in cases like science museums, replicas can play an important educational role.

Furthermore, while libraries and archives focus on loans, copies, or electronic access, museums primarily communicate their collections through exhibitions. This difference highlights their unique way of providing access to information and cultural heritage (Brenna, Christensen, & Hamran, 2019).

Museums share a common origin with libraries and archives as spaces for the preservation of knowledge. From the Greek "mouseion," like the iconic Library of Alexandria, to the 16th-century cabinets of curiosities that mixed art and nature, these institutions have evolved significantly. In the 19th century, natural history societies integrated books and objects to educate the public, marking an early convergence between museums and libraries. However, the 20th century established clear differences in specialized practices and roles. Today, the digital age blurs these boundaries, promoting collaboration and integrated access to cultural heritage (Rasmussen & Hjørland, 2023).

Libraries, archives, and museums: Convergence to the digital

The transition to digital in archives, museums, and libraries, institutions focused on access to information, is a continuous and evolving process. The digital era paradox is clear: the library is everywhere and nowhere. On one hand, everything seems immediately available on the web, as if the library has expanded to be everywhere. On the other hand, it is impossible to delineate the presence or absence of libraries on the Internet. In our everyday lives, the library on the Internet meets our information needs, yet we also know that what is most relevant may be hidden behind paywalls or require expert digging or physical consultation (Skjerdingstad, 2020).

In this context, libraries stand out by facilitating both physical and digital access to their collections through reading rooms, lending services, and online platforms. They also provide search tools, such as databases and reference works, and promote recreational reading, thus adapting to the needs of the digital environment (Rasmussen & Hjørland, 2023).

A digital archive is an organized collection of electronic documents (such as texts, images, audios, videos, and others) managed in a way that ensures their long-term preservation and access. Digital archives focus on the authenticity and integrity of documents, preserving both their content and the context in which they were created. Additionally, they follow the principles of provenance (the origin of the document) and original order (the structure in which they were originally organized) (Turton, 2017).

The digital age has deeply transformed the relationship between libraries, archives, and museums, blurring the traditional lines that differentiated them. Marty (2009) identifies that the rise of digital resources has generated a convergence among these institutions, highlighting their shared information needs, common challenges, and collaboration opportunities. These collaboration opportunities include:

- Improving access to information: Collaboration allows for the sharing of digital resources and the creation of centralized access points for information retrieval across multiple institutions. This benefits user seeking information on a specific topic without having to navigate the traditional boundaries between museums, libraries, and archives.
- Enriching the interpretation of cultural heritage: The combination of museum objects, archival documents, and bibliographic resources can offer a more comprehensive and contextualized understanding of cultural heritage, supporting scientific research.
- Professional development: Collaboration between educational and cultural institutions can lead to the development of interdisciplinary training programs that prepare a new generation of professionals capable of working in convergent environments. This evolution in the role of information professionals requires that they acquire new skills in managing digital resources, digital curation, and information mediation in online environments.

Digitization has led to a blurring of the boundaries between LAM institutions. Digital archives, museums, and libraries converge in the management and dissemination of digital information. This convergence is reflected in the

emergence of digital platforms that aggregate content from various institutions, such as Europeana, Deutsche Digitale Bibliothek, and Trove (Rasmussen & Hjørland, 2023).

Digital repositories are a tool resulting from the digitization processes in LAM institutions. These digital platforms function as spaces for storing and providing access to digital collections from various institutions. Some examples of digital repositories mentioned in the sources include the ACM Digital Library, Internet Archive, and Project Gutenberg (Wong, 2017). These collections can include a wide variety of formats that transcend the traditional categories of archives, libraries, or museums, integrating various types of documents and digital objects that enrich the user experience and expand the concept of preservation and access (Brenna, Christensen, & Hamran, 2019). For example, old photographs and engravings can complement textual collections like manuscripts or old books, offering a visual context that enhances the understanding of information. Additionally, sound recordings, such as historical audios or interviews, can be integrated with other materials to provide a more complete and multifaceted narrative about a historical event or period.

By integrating these different formats, digital repositories break the boundaries of traditional archival systems, bringing the user experience closer to a more holistic approach to information, where different types of materials complement and reinforce each other, expanding educational, research, and preservation possibilities. This convergence of media offers a richer and more dynamic view, where the boundaries between archives, libraries, and museums become increasingly blurred (Wong, 2017).

Below are the key elements that shape the management of LAM institutions in the digital realm. These aspects, including digital preservation, access and use of information, user experience, metadata schemas, and copyright, directly influence how libraries, archives, and museums adapt their services to meet contemporary needs in an increasingly interconnected and technologically advanced environment.

Digital preservation involves the comprehensive planning and management of digital assets throughout their lifecycle, from creation and active use to long-term storage in repositories that allow for future reuse. This process goes beyond merely storing files; its primary goal is to ensure the authenticity, integrity, accessibility, and usability of digital resources over time (Wong, 2017).

A challenge in digital preservation is technological obsolescence. Institutions must implement strategies such as data migration to new formats, emulation of obsolete software and hardware, and data encapsulation, which combines content with the necessary information to interpret files in the future. These techniques ensure that digital materials are not only physically preserved but also remain functional and relevant in changing technological contexts (Avila, 2020).

Digital technologies have profoundly transformed **user access and experience in the services** offered by LAM institutions. These institutions have digitized and adapted many of their services to facilitate remote consultation, allowing users to access resources from anywhere with an internet connection. For example, online catalogs provide the ability to explore entire collections without needing to visit the institution physically (Beitra, 2008). Additionally, digital interlibrary loan has significantly expanded access to electronic documents, allowing libraries to share digital resources with each other and offer users a wider range of materials without geographical restrictions (Orera, 2020).

In the case of archives, many of their services have been digitized and automated, particularly those managing citizen-related documentation, such as civil registry or judicial records. These archives, crucial for guaranteeing rights and administrative processes, have adopted digital technologies to improve the efficiency and accessibility of their services (Hawkins, 2020). For example, essential documents such as birth certificates, marriage certificates, and court records are now available online, facilitating access and significantly reducing response times for users.

This digital transformation not only responds to the demand for more agile and accessible services but also strengthens the preservation and authenticity of documents. By digitizing records, archives mitigate the deterioration of physical documents, ensure the integrity of information, and provide automated search tools that

simplify access (Hawkins, 2020). In this context, automation and digitization not only modernize the functioning of archives but also expand their capacity to meet the needs of citizens in an increasingly interconnected world.

Beyond consultation and lending, digital information services have diversified to meet the needs of users in the virtual environment. This includes the creation of subject guides, the organization of web resources, the digitization of historical documents, and access to databases and others (Beitra, 2008). These services not only optimize information retrieval but also enhance the efficiency of obtaining relevant materials, helping users navigate the web.

Metadata are another component that describes digital informational resources, detailing content, quality, and format to facilitate identification and access. Schemas like Dublin Core, used in digital repositories and OPACs, promote interoperability by structuring information compatible with linked data technologies like RDF. This linked semantics connects bibliographic and thematic attributes, creating accessible and reusable knowledge networks (Hawkins, 2021).

Shared standards such as RDF and SPARQL, and conceptual models like FRBR and RDA, complement metadata use by ensuring interoperability between library, archive, and museum systems. These models organize bibliographic data, adapting it to linked data principles and promoting access through standard vocabularies. Initiatives like BIBFRAME and LRM consolidate this interoperability, integrating multiple standards for better access to bibliographic records. Together, metadata and shared standards drive more efficient digital librarianship, enabling the development of accessible, connected, and continuously evolving services (Avila, 2020).

Managing copyright in digital repositories is a complex challenge that requires careful attention. To balance access to information with the protection of intellectual property, it is essential that these platforms include detailed metadata about usage conditions, author attribution, and applicable licenses for the materials they host. The use of open licenses, such as those from Creative Commons, broadens the possibilities for interinstitutional collaboration and facilitates resource sharing, allowing users to access materials under clear, uniform terms. To ensure the legality and sustainability of these operations, digital repository policies must strictly adhere to current legislation and institutional regulations (Avila, 2020).

Innovative Services and Projects of LAM in the Digital Context

In the LAM context, numerous projects and initiatives stand out as exemplary references and models of best practices. Below, several of these are highlighted and explained in detail.

Europeana (https://www.europeana.eu/)

Europeana is an initiative of the European Union aimed at providing digital access to European cultural heritage. Launched in 2008, this digital platform brings together content from over 4,000 cultural institutions across Europe, including museums, libraries, and archives. Currently, it offers access to more than 58 million digital items, including books, works of art, music, films, and historical documents (Europeana, 2024).

The main goal of Europeana is to preserve and promote European cultural diversity through digital tools that encourage access, research, and the reuse of these resources. Additionally, Europeana uses open standards such as Dublin Core and RDF to ensure interoperability between systems and facilitate the creation of linked data. In this way, it aims to connect cultural institutions, enrich the user experience, and support innovation in sectors such as education and creative industries. These standards are essential in the digital context because they allow cultural information stored in different formats and systems to be reused and linked, promoting the construction of a richer and more connected semantic web (Europeana, 2013).

Dublin Core is a metadata schema widely used to describe digital resources. It includes basic elements such as title, creator, date, and format, facilitating a uniform description of cultural content. Europeana employs Dublin Core as a foundation to structure and describe its collections, ensuring that data from different institutions are compatible (Europeana, 2013).

RDF is a framework for modeling structured and linked data. It allows metadata to become "linked data," meaning resources that are interconnected through the web. This enriches the user experience by presenting cultural resources in broader contexts, such as thematic, historical, or geographical associations (Europeana, 2013).

However, Europeana has developed its own data model, EDM, based on RDF and Dublin Core. EDM allows for the combination of descriptions of cultural objects from different sources while maintaining fidelity to their original descriptions. It also facilitates the integration of data from libraries, museums, and archives into a common structure (Europeana, 2013).

Digital Public Library of America (https://pro.dp.la/)

The Digital Public Library of America (DPLA) was officially launched in April 2013, although its planning began in October 2010 when leaders from libraries, technology, and education came together to create an open, distributed national digital network that would integrate resources from libraries, universities, archives, and museums across the country. The primary goal of the DPLA is to provide free and open access to digitized cultural materials from the United States, making available a vast amount of resources such as photographs, maps, historical documents, audiovisual recordings, among others (Digital Public Library of America, n.d.).

Regarding its collections, the DPLA houses more than 30 million digital objects from over 4,000 partner institutions. Users can access materials through a single portal, making it easier to search for and discover information. The collections cover a wide range of topics, from art and literature to history and science, providing comprehensive access to the cultural heritage of the United States (Digital Public Library of America, n.d.).

The Digital Public Library of America (DPLA) uses a metadata model called the DPLA Metadata Application Profile (MAP), which is based on the Europeana Data Model (EDM), adapted to the needs of cultural institutions in America. This metadata profile defines how metadata is structured and validated in the DPLA, and facilitates interoperability between digital resources from different institutions. Additionally, the DPLA uses JSON-LD for metadata serialization and access through its API. Its main goal is to provide access to the cultural and scientific wealth of the United States, promoting the reuse of these resources without legal restrictions and fostering innovation through applications that use these metadata. The DPLA ensures that most of its metadata is not subject to copyright and is available under a CC0 public domain license, making it freely accessible and usable (Digital Public Library of America, n.d.).

World Digital Library (WDL) www.wdl.org

The World Digital Library (WDL) is an international project launched in 2009 by UNESCO and the United States Library of Congress with the aim of providing free and open access to a wide variety of cultural and heritage materials from around the world. Its mission is to promote understanding between cultures by making available significant documents, such as manuscripts, books, maps, photographs, and recordings, from libraries, archives, and museums in various countries (World Digital Library, 2024).

The WDL's collections cover topics such as history, science, literature, the arts, and more, providing a global view of human cultural heritage. The website highlights collections of:

- Manuscripts and rare books: The WDL houses a rich collection of ancient manuscripts, books, and texts that represent the intellectual heritage of various cultures. This includes religious, philosophical, and scientific texts, as well as historical books dating back to past centuries. Examples include works from classical antiquity, medieval documents, and manuscripts of historical importance to several civilizations.
- Maps and cartographic documents: Another significant part of the WDL collections consists of ancient maps and cartographic documents, which allow for the exploration of the evolution of geography and cartography from the 15th century to the modern era. These maps include explorations, geographical discoveries, and other key elements of territorial knowledge from various civilizations.
- Historical photographs: The WDL contains thousands of historical photographs documenting key events in world history, as well as aspects of daily life in different cultures. The images offer a unique window into the

past, from the first black-and-white photographs to early visual documentation of cultures, cities, and people around the world.

- Audio and video recordings: The WDL's audio and video collections include historical recordings, interviews, and audiovisual material of cultural significance. This includes recordings of traditional music, historical speeches, and other important sound contributions that enrich global cultural heritage.
- Archival articles and legal documents: In addition to visual and audio resources, the WDL also provides access to legal documents and historical archives that reflect the political, social, and legal evolution of different countries. This includes constitutions, treaties, and other official documents of historical importance.

Internet Archive (https://archive.org)

Internet Archive is a nonprofit organization founded in 1996 with the goal of providing free and permanent access to digital collections of cultural, educational, historical, and scientific archives. Through its digital repository, it offers access to millions of books, films, audio recordings, software, archived websites, and other resources. The main mission of the Internet Archive is to ensure that access to information and culture is not limited by the passage of time, physical deterioration, or technological changes (Internet Archive, n.d.).

The Internet Archive is constantly expanding, with collections that include, among others, digitized books from libraries around the world, historical audio recordings, retro software, and audiovisual material. As the web archive has grown, so has its commitment to providing digital versions of other published works. Today, the archive contains:

- 835 billion web pages
- 44 million books and texts
- 15 million audio recordings (including 255,000 live concerts)
- 10.6 million videos (including 2.6 million television news programs)
- 4.8 million images
- 1 million software programs

The platform allows users to access content that is not easily available through other means, promoting digital preservation and access to educational and cultural resources. Additionally, the Internet Archive’s Wayback Machine is a popular tool that allows users to explore previous versions of websites. Launched in 2001, its goal is to preserve the history of the web, allowing access to sites that no longer exist or have changed. Users can enter a URL and explore what a website looked like on specific dates, offering a valuable tool for researchers, historians, and general users who wish to consult previously available web content.