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COLLECTION DEVELOPMENT IN DIGITAL COLLECTIONS

DESENVOLVIMENTO DE COLEÇÕES EM COLEÇÕES DIGITAIS

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ABSTRACT
Reports paradigm changes that occurred in the transition from physical collections to digital ones. It presents recommendations for creation and maintenance of these collections, based on the examination of specialized literature, addressing aspects of content, technical feasibility, functionality, reliability, supplier support, licensing, preservation, accessibility and contractual issues. It discusses aspects that must be observed in the decision-making on the choice to keep or not printed documents when the digital equivalent exists. It concludes with the synthesis of the recommendations, also indicating studies related to the collection development.

KEYWORDS
Collections development. E-Book. Data bases.

RESUMO
Relata as mudanças de paradigmas ocorridas na transição de coleções físicas para as coleções digitais. Apresenta as recomendações para seleção, criação e manutenção dessas coleções, a partir do exame de literatura especializada, abordando aspectos do conteúdo, viabilidade técnica, funcionalidade, confiabilidade, suporte do fornecedor, licenciamento, preservação, acessibilidade e questões contratuais. Discorre sobre aspectos que devem ser observados na tomada de decisão sobre a escolha de manter ou não documentos impressos quando há o equivalente digital. Conclui com a síntese das recomendações, indicando também estudos relacionados ao desenvolvimento de coleções.

PALAVRAS-CHAVE
Desenvolvimento de coleções. Documento eletrônico. Bases de dados.

1 Introduction

Document access through digital availability has been part of many types of libraries for many years. Whether due to database acquisition or e-book purchases, many managers choose to offer digital collections for a number of advantages: content diversification, simultaneous and geographically independent access, reduced purchase and storage costs, reduction of technical processing time of documents, among other reasons.

Buckland (1995) lists other very important benefits, such as the expansion of access and the possibility of "customization" of the collection for geographic convenience, since several interest groups can be met through cooperation between institutions and simultaneous access to items.

In this reality, it will be necessary to evaluate specific aspects of this new context where physical and electronic support coexist, such as the cost of access and the possibility of library cooperation. In Vergueiro's (2000) view, the social importance of selection activity has been increased rather than minimized by electronic information technologies. Romero (2007) adds that the advent of digital media has made the process of document selection, acquisition and organization more complicated than ever.

One of the paradigm shifts that has occurred with the advent of electronic collections is, according to Dias and Pires (2003), that the value of the library of the future will not be measured by the size, age and scope of collections, but rather by the strength of accessibility to interconnections. with network.

Another modification noted by Gregory (c2011) is that librarians often select material available on the web but do not actually collect it. Depending on the license of the material it is only possible to direct the user to a page and not have the content. Already in the late 1980s, Buckland (1989) argued that the growth of remote access to materials would make ownership less important compared to access.

Another substantial change is cited by Cunha (2009), who pointed out that, unlike in the past, information resources can have many origins: "originally digital materials, licensed e-journals, e-books, and substitute materials for printed works".

Horava (2010) mentions the prescriptions of many librarians regarding electronic documents. However, the author states:

> Our collections are not disappearing. Rather, they are becoming extraordinarily important as our web presence allows us new capabilities to connect and be relevant to the population we serve. By focusing on remote access, active management (locally and in collaboration with external groups), greater awareness of learning outcomes and the researcher's agenda, and a sustainable approach with careful

nuances to the procurement activity, we can increase the value and use of our collections.

Despite the fear of some professionals and the change of paradigms, Schmidt (2004) evaluates that the transformation that occurred in the selection process was a natural step forward, even if it apparently conflicts with the values and history already rooted.

Examining the specialized literature on the subject can assist information professionals in the development of sustainable, intelligent digital collections that adequately meet users' informational demands. Therefore, the purpose of this article is to identify aspects that must be observed for the creation and maintenance of digital collections. To achieve this goal, the methodology used will be the literature review, through selective examination of the documents on the subject, emphasizing the precepts of associations and organizations that dealt with the subject. The review considers the transition of part of conceptual precepts and intrinsic characteristics to electronic documents.

2 Literature Review

The literature review of this work was narrative. According to Lamb et. al. (2007, p. 429-430) in the review of the narrative or traditional literature, the search for sources is not predetermined and specific, but often less comprehensive. The selection of articles has interference of subjective perception, therefore, is arbitrary.

The first step was an examination of the most recent theses and dissertations on “collection development” applied to the digital context. From the observation of the most recurrent terms and authors, we set out to search the national and international scientific journals.

The bibliographic research on electronic media used the databases available through the Capes Journal Portal, mainly the databases Library and Information Science Abstracts - LISA; Library, Information Science & Technology Abstracts with Full Text - LIST and EMERALD. The summary of specific journals such as Library collections: acquisitions & technical services and Collection building were also examined in order to locate the specific bibliographic production on the topic.

Noteworthy is the search for materials from the International Federation of Library Associations and Institutions (IFLA) and National Information Standards Organization (NISO) documents where publications with recommendations for the construction of digital collections were found.

Nationally, we used the databases Archiving, Library Science, Information Science, Documentation and Museology - ABCDM; Information Science Databases - BRAPCI and the Brazilian Digital Library of Theses and Dissertations - BDTD.

The keywords used in the national databases were “digital library (s) AND collection development (s)”; “Collection development (s)”; “Collection management (s)” and “electronic book (s)”.

Then, the following keywords were used to retrieve the international scientific literature: “collection development”; “Collection management”; E-collection; eBooks; “Collection development policies”.

When necessary, a specific consultation was held to clarify technical concepts, such as usability and accessibility topics.

2.1 Contents

In general, analogue document content evaluation criteria can be used for the examination of electronic documents. However, a number of unique content criteria for electronic resources must be considered, particularly when determining the choice between physical and digital format.

Johnson et. al. (2012, p. 6) prepared the guide “Key issues for e-resource collection development: a guide for libraries”, an institutional publication of IFLA. In the paper, the authors state that the criteria should support the main objectives of the organization; complement or add depth and breadth to the existing collection based on subject profiles; be of a certain quality (e.g. peer reviewed or have a reputable producer); support the needs of the target audience and generate an acceptable level of utilization.

Rodrigues and Carvalho (2003, p. 7) reinforce that the aspects related to the content of digital documents are very similar to those of printed documents: the scope and thematic scope, the authority of the authors or producers of the resource, the updating, the organization and the presentation of the information. In the case of digital versions of documents that also exist in print, the authors call for special attention to the added value of the digital version (eg other types of content or usability features).

Johnson et al. al. (2012, p. 6) add the consistency of electronic publishing to the printed equivalent, the availability of previous editions, the timeliness of online content, and the frequency of updates as criteria in relation to content that pay special attention.

In turn, Gregory (c2011, p. 62) warns that determining the accuracy of materials available electronically, especially on the World Wide Web, is a critical factor in the selection and evaluation process. Free materials should receive special attention, especially if they are not produced by renowned authors or entities.

2.2 Technical Feasibility

These are aspects of technical feasibility according to Johnson et. al. (2012):

- Availability: remote access and individual access. Remote Web access is often preferable because it provides additional benefits such as faster upgrade, optimized access, reduced storage costs and reduced maintenance and maintenance costs;

- Authentication: Internet Protocol - IP password or access filtering. Usually concurrent access is allowed. Access is also possible through a proxy server; This way users can access electronic content outside the physical limits of the library. Access by using a password is not recommended as it may cause access control difficulties as a registered member may improperly pass the password to an unauthorized person;

- Hardware and software compatibility: In principle, the feature should be compatible with existing devices. However, if necessary, attention should be paid to the additional cost of purchasing, installing, and supporting appropriate software or multimedia components. Another compatibility factor is the browser, which must be adjusted according to the requirements on local computers. Determining the file formats (HTML, SGML, XML, PDF, epub, etc.; and formats such as JPEG, MPEG, etc.) that databases use is important: depending on the purpose, size and type of document will be A specific file type is desirable.

2.3 Functionality and Reliability

Considered an essential functionality, the search engine must be powerful, flexible and easy to use. According to Johnson et. al. (2012, p. 8) Common features include keyword search and Boolean search, full-text search, ability to browse indexes and titles, sorting by relevance, thesaurus, truncation, navigation, search history, and transliteration.

The authors add (2002, p. 9) that exporting and transferring files is a desirable requirement. Printing, emailing, downloading to a computer, other electronic device, or bibliographic management software (such as Endnote, Mendeley, BibTex, etc.) are advantages to consider. Printing should be easy and the download should not have any restrictions or additional fees imposed.

Some tools can also be used concurrently with digital collections, allowing for the integration of workflows and end users. NISO, in a paper entitled “The Framework for

Guidance for Building Good Digital Collections", cites as examples of this integration folksonomy or "social tagging" (2007, p. 23).

Johnson et. al. (2012, p. 9) present the need for the system to support integration with other resources through the reference link and full text. Content should be indexed in discovery tools to facilitate search and effective access to local and remote resources.

NISO (2007, p. 22) also reinforces the importance of interoperability. According to the organization, a good collection is interoperable, meaning its metadata must be found by external search engines. This condition shall be provided for contractually, including the conditions for availability and quality of this metadata. This is one of the ways to expand the use of collections and can help their sustainability.

The database or digital library must be reliable and available. That means 24/7 access. Johnson et. al. (2012) indicate that the system must be stable, with clear restrictions on unscheduled interruptions. It must also be technologically up-to-date and have the right network capacity and infrastructure to support multiple users and optimal response times.

Also, the object must have authenticity. NISO (2007, p. 55) defines authentication as the act of determining whether the object conforms to its documented origin, structure, and history and whether the object has not been corrupted or altered in an unauthorized manner.

2.4 Supplier Support

As directed by Johnson *et. al*. (2012, p. 10) the supplier should offer:

- User training and support: Initial and on-going training option, including providing online documentation or manuals.
- Provision of trial and product demonstration: Trials are particularly useful in supporting the product evaluation process in terms of technical issues, functionality and reliability.
- Technical support and system notification process: Manage and communicate planned downtime and content or platform changes in advance and effectively.
- "Customization" with library or institution identification is desirable. The logo or trademark may be used for this purpose.
- Statistical reports: help in understanding the cost versus benefit of products. Data should preferably comply with recognized standards such as Counting Online

Usage of Networked E-resources - COUNTER and / or the Standard Usage Statistics Harvesting Initiative - SUSHI.

COUNTER proposes a code of practices and protocols that allows publishers and vendors to report on their resource usage consistently. In addition, it requires publishers to submit usage statistics for an independent and rigorous audit. This way, librarians can have a better understanding of how contracted content is used, being able to compare usage statistics from different vendors and get useful metrics such as cost per use.

Version 5 (Cohen, 2019) contains several usage indicators such as: total number of times an item was accessed, number of chapters or articles searched and downloaded per user, number of times a complete content was downloaded, total searches in one database, how many users were denied access due to non-hiring content, etc. The SUSHI standard (ANSI / NISO Z39.93-2014) defines the automated request and response model for the collection of electronic resource usage data (NISO, 2019).

2.5 Licensing

The legal issues involved in the use and collection of electronic information are becoming increasingly complex, especially as a result of new electronic resource formats, scanning equipment and Optical Character Recognition (OCR) software. Gregory (c2011, p. 141-142) indicates that, in this context, digital rights management software and hardware (DRM) are present in various issues of collection development.

Gregory (c2011) clarifies that DRM systems include a variety of technologies that provide rights owners with a variety of levels of control over how digital content and services can be used. Generally, DRM technologies enable copyright holders to protect their electronically available materials from unauthorized use through hardware or software and determine under what circumstances users may access the content. They can, for example, enable or restrict printing and sharing. The components of a DRM system may include: security containment to prevent unauthorized access; manifestation of rights; identification and association of metadata; identification of people and organizations with potential for interaction with content; technologies to associate identifiers such as watermarks and payment systems.

Although it has several advantages such as reduced transaction costs and price discrimination, Bittar (2015, p. 65) warns that the DRM system is constantly questioned not so much by the technology itself, but how it is structured, as it still allows use for purposes not related to copyright protection. It should be noted that the system itself is not infallible and cannot completely prevent piracy.

In an attempt to relax the relationship between the copyright of the author and the public's need to access the work, the Creative Commons license was created. In addition to

providing human and machine-readable license models of recognized legal value, the initiative simply clarifies the permissions and restrictions for the public.

There are also unlicensed materials that may be in the public domain or open access. Content is free, there is usually no need for authentication and multiple simultaneous accesses are possible. However, Serra (2015, p. 146-148) points out as disadvantage the low or lack of credibility of the material, eventual difficulty of use due to quality; lack of maintenance and no guarantee of persistence of links for access on other platforms.

In addition to access control, another challenge is defining authorized users and locations. Gregory (c2011, p. 149) warns that the vendor defines "user" and "access" may be limited to a computer or building. Who will be responsible for unauthorized use and what will be the consequences of any misuse?

2.6 Preservation

According to Boeres (2009, p. 68) digital information must be preserved within the limits and care inherent in technology, seeking to prevent information from becoming unavailable over time, due to misuse of the document, or obsolescence of the media. For this reason, the analysis of the burdens inherent in the digital preservation of content is a fundamental step.

Gregory (c2011, p. 196) clarifies that material preservation initiatives may come from the publisher himself (or even from the aggregator or seller), from the library itself, or from cooperative agreements. Often the high cost for library preservation initiatives discourages this practice, with the exception of locally produced materials. Long-term archiving and preservation of digital materials is a difficult and expensive endeavor that requires substantial resources and serious commitment.

Archiving data is an important step for preservation. Johnson et. al. (2012, p. 10) warn that the frequency of backups and the provision of data on physical media should the company cease or transfer publications should be considered by the person who selects certain products. The library must manage archiving and access in the format offered, as well as characteristics that may be lost from the original resource. Also, according to the authors, one must take into account if there is archiving policy of the resource provider.

There are several initiatives that assist in the digital preservation of documents such as LOCKSS and Portico, but one must consider reliability in delegating archiving. It is also important to assess the collection of any access fees or restrictions; the anticipation of migrating files to new formats or platforms to keep pace with the progress and impact of terminating or terminating perpetual access to previously signed content.

NISO (2007, p. 9) recommends special attention to these aspects, which are described as part of the digital curation of data. The organization also highlights the importance of

preservation strategies that typically involve format transformation, hardware / software emulation, or combinations of the two.

Regarding the sustainability of collections, NISO advises the persistence of objects (2007, p. 25). A good object exists in a format supported on current and future platforms. Choosing file formats should consider not only access, but also their eventual degradation. Therefore, the quality of the file alone should be considered.

The Library of Congress recommends using PDF / A for long term preservation. The PDF / A standards are developed and maintained by a working group with representatives from the US government, industry, academia, and active support from Adobe Systems Incorporated. In addition to the Library of Congress itself, several academic repositories and US government agencies recommend use (LIBRARY OF CONGRESS, 2019). In Brazil, the Superior Council for Labor Justice and several institutional repositories of Federal Universities also adopt PDF / A as a file format.

Another initiative is global object identification. Using standardized identifiers such as ISBN or DOI makes cases of ambiguity between objects difficult, allowing mapping depending on the context of use. (NISO, 2007, p. 52).

2.7 Accessibility

According to NISO (2007, p. 12) accessibility is the property of being usable by persons with disabilities. Interfaces should be designed to maximize usability for visually impaired people, hearing loss, loss of mobility (e.g., difficulty using a mouse) and even cognitive disabilities.

The arrival of information technology has brought significant gains to the disability community. Emphasizing the context of the visually impaired community, Kavanagh and Sköld (2009, p. 56) point out that the impact of technologies interferes with the flexibility of how libraries produce, store and distribute their collections. Examples include transforming reading through digital audio books or even converting content using a braille translation program. Hard copy braille and portable displays / keyboards are examples of the allied use of software and hardware for the benefit of this user group.

Malheiros (2019, p. 126) points out that digital collections also represent a major advance in mobility, as users would no longer have to face the barriers of physical accessibility. In addition, the author explains that digital collections can be more economical alternatives, since a Braille book costs three times more than the ordinary book, besides the limitations of circulation and space. While the advances are undeniable and substantial, Malheiros (2019, p. 132) states that several guidelines and standards must be observed to ensure that content is

actually accessible to these users. The author cites the standards of the World Wide Web (W3C) and E-mag consortium: e-government accessibility model as examples of instructions.

Regarding the collection, Malheiros (2019, p. 172) adds that the digital library collection must contain items that can be read by voice programs (a feature used for blind users) and in a format that can be expanded. (feature used by low vision users). McNaught (2014, p. 35) also recommends that there is the possibility of color and contrast changes and alternative text for images and tables, so that voice programs can cover all content. Equally important is compatibility with assistive technology devices.

The file format also interferes with accessibility. McNaugth (2014, p. 35) explains that texts that are "photographs" of documents and the flip system can make it difficult or impossible to use. Additionally, metadata used for typographic appearance rather than semantic meaning can eliminate benefits for users with disabilities.

2.8 Usability

While the quality of content in digital libraries or databases is the main motivating factor for choosing a particular product, usability is essential. The placement of digital objects is intrinsically dependent on the electronic medium, so usability evaluation becomes so important.

Even capable of meeting users' need for information, it is possible for the public to abdicate the use of a particular resource due to the difficulty in locating and / or using the information. Emery and Stone (2013, p. 11) even state that if a feature is not as easy to use as Google, the user may look for the information elsewhere.

Nielsen (2012) defines usability as a quality attribute that evaluates how easy interfaces are to use. The term also refers to methods for ease of use during the design process.

According to the same author, usability is defined by five components:

1. Learnability: Ease for users to perform basic tasks the first time they encounter the interface;
2. Efficiency: how quickly they can perform tasks when they have interacted with the interface;
3. Memorization: When users return to the system after a period of using it, how easily can proficiency be restored;
4. Errors: How many errors users make, how serious are these errors, and how easily they can recover;
5. Satisfaction: How nice it is to use the design.

Also, according to Nielsen (2012) are quality attributes of interfaces to:

1. Utility: The interface has the necessary features for the final audience;
2. Usability: user-friendly and pleasant interface;
3. Enjoyable: The interface is useful and has usability.

Johnson et. al. (2012, p. 8) cite as examples of user-friendly system features online tutorials, home menus, navigation aids and context-sensitive help options, personalization options (such as subscribing to feeds / alert alerts). email, ability to save search history, etc.). Sorting and sorting results (eg, sorting by author, title, date, relevance, concepts, etc.) can also be cited as a feature in a usability system.

There are several methods for assessing the usability of a system. Examples are requirements lists, system heuristics, and other tests that can be performed during system design or later when the design is already consolidated.

Another method is user-centered assessment. According to Bastien (2010) in this methodology users are asked to answer typical product questions or are simply asked to explore the interface freely while researchers observe and record points that lead to errors or cause difficulties. Once design flaws are identified, improvements in ergonomic quality or design changes are proposed.

2.9 Contractual Aspects

Those responsible for selecting and acquiring databases should carefully review the business models available on the market. According to Arora (2018) there is no standard pricing model for electronic resources, as bids are generally based on various criteria and variables, such as user population size and number of concurrent users.

Costa; Cunha (2005) point out business models as perpetual access, subscription, short-term lending and user-driven acquisition. Each model should be evaluated according to the context of the contracting information unit, which should consider, among other things: the number of users and their information needs, variety and quality of content and, of course, available budget.

Regardless of the business model chosen, contractual provisions regarding supply should cover access options. Johnson et. al. (2012) clarify that this means defining whether a single user or multiple users will be able to access the content simultaneously and what will be the form of authentication.

Another aspect recommended by the authors is that the contractual termination, reimbursement period, contractual agreement period, and clauses relating to compliance with

the laws within the legal jurisdiction governing the library or consortia are contractually provided.

Also, according to the authors, archiving and post-termination rights are equally objects of attention. You must first consider what will be kept from access in the event of termination or breach of contract. Will the library remain with any access? Is there a possibility to get the metadata? Is there a platform maintenance fee even with the acquisition of files and metadata?

Another precaution cited by Emery and Stone (2013, p. 17) is the establishment of a contract price limit. Most libraries cannot readily absorb the standard annual inflation rate of five to 12 percent on average on most subscriptions. Therefore, if a price suddenly rises by 20 to 30 percent, for example, the feature or feature set may need to be canceled.

3 Replacing Supports Printed by Digital Content

Most information units have a collection of printed and electronic items. However, often the same content is available on both media. Because of the space savings, financial resources, and improved team task distribution, it is necessary to decide on the exclusive adoption of the electronic format. For example, "deduplication," which is the elimination of duplicate titles already acquired in various formats, often occurs in the acquisition of electronic journal collections.

Johnson et. al. (2012) consider that, before eliminating the printed equivalent, one must analyze:

- Timeliness: Electronic resources with printed equivalents should not be left behind their printed counterparts. It follows, therefore, that the electronic resource most of the time must be the most up to date.

- Cost-effective: The electronic resource should provide sufficient added value over the printed equivalent or other analog formats. Added value can be, for example, increased functionality and greater accessibility.

- Accuracy and completeness: The electronic feature must reflect identical or increased content compared to the printed equivalent.

- Maintenance of two formats: Duplication of electronic resources with equivalent analog formats may be considered if electronic publishing is subject to archiving restrictions. If the cost of duplication is minimal, purchasing multiple formats is the best way to meet the needs of different users in terms of access and convenience.

4 Final Considerations

Several Brazilian authors discuss the need to elaborate a policy for the development of collections in digital collections, such as Cunha (1999, 2009); Weitzel (2002) and Caribé (2008). There are also specific studies that focus on the development of digital collections, such as Serra e Silva (2015), Serra (2015), Santanna (2015) and Martins (2016). There are those who dedicated themselves to studying the development of digital collections in university libraries, such as Dias, Silva and Cervantes (2012), Santana (2013), Magalhães (2014), Silva (2014), Oliveira (2016), Pinheiro (2017). and Santos (2018).

Although information units have been using databases and eBooks in Brazil for a significant time and the Brazilian scientific literature has addressed the issue, no national study was found that specifically addresses the issues highlighted in the literature review of this article.

Therefore, summarizing the guidelines of the international scientific literature, it is recommended to observe the following aspects related specifically to digital collections:

- **Content:** Additional content or functionality of digital versions of printed documents; timeliness and reliability of content (especially in free versions) and frequent updates;

- **Technical feasibility:** remote access; IP authentication; hardware, software and browser compatibility;

- **Functionality and reliability:** efficient search engine, keyword searches, boolean and full-text search, ability to browse indexes and titles, sort by relevance, thesaurus, truncation, search history, and transliteration; possibility of exporting to bibliographic management software, sending by e-mail and downloading without limitations; folksonomy or social tagging; interoperable metadata; stable system with structure to receive multiple access and authenticity;

- **Supplier support:** user training and offering tutorials; availability of trials; interface customization for contracting institution identification and statistical reporting according to recognized standards;

- **Licensing:** efficient access control with the eventual use of DRM; clear definition of authorized users and locations;

- **Preservation:** archiving policy, providing for management responsibility and digital curation of data; use of standardized identifiers;

● **Accessibility:** interface compatible with accessibility guidelines, collection able to be read by voice programs or have a larger view; possibility of color and contrast change;

● **Usability**: useful, easy and pleasant interface; navigational aids; customization options; ability to rank and sort search results;

● **Contractual aspects:** explicit establishment of the form of user authentication, archiving and post-termination rights and price adjustment limit.

It is concluded that, for the development of efficient digital collections, in addition to the above related aspects, it is also indicated the study of the business models practiced, the constant monitoring of the publishing market and knowledge about the legal devices for the purchase of these contents, especially in institutions. governmental Another recommendation in the academic and professional fields is the development of studies focused on cooperation networks, as it is believed that these networks can expand or even enhance the resources involved in the formation and management of digital collections.

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