Evaluation of Digital Preservation Maturity in Libraries and Archives of the Metropolitan Area of Puerto Rico Using the DPC-RAM Model – Report

Award: LG-256660-OLS-24

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Summary

Digital preservation represents a strategic challenge for libraries and archives in the face of the accelerated growth of physical and electronic information resources. This article consolidates the findings of a study conducted in seventeen institutions located in the metropolitan area of Puerto Rico, applying the Digital Preservation Coalition's Rapid Assessment Model (DPC RAM) as an analytical tool. Using capability maturity models (CMMs) and their respective assessment criteria, organizations can now objectively assess their existing strategic capabilities, identify gaps, and promote development to foster innovation in digital archival preservation. The findings help diagnose the level of digital preservation maturity and provide guidance for policies, capacity development strategies, and sustainable solutions that will enable long-term documentary preservation.

Introduction

Digital preservation provides a strategy to ensure that archives and libraries remain relevant in an environment where digital resources are multiplying exponentially. The implementation of capability maturity models (CMMs) enables organizations to assess their strategic capabilities objectively, identify existing gaps, and foster innovation in digital preservation within archives. Beyond a simple diagnosis, these processes provide valuable data that strengthens the skills of archivists, librarians, and infrastructure and technology teams. In this way, a culture of constant updating is fostered within institutions, ensuring the delivery of relevant digital collections and services. Likewise, institutions are enabled to strategically plan future investments in infrastructure, personnel, and key resources (Nauli et al., 2023).

CMMs offer a hierarchical structure that guides organizations in moving from initial levels, characterized by ad hoc procedures and reactivity, to optimized levels where standardization, data-driven management, and continuous improvement predominate. In the field of digital preservation, these models have been adapted to develop specific frameworks such as the Digital Preservation Capability Maturity Model (DPCMM), designed to assess the institutional capacity to manage, preserve, and ensure long-term, sustainable access to digital objects. (Bodero Poveda, De Giusti, & Morales, 2022)

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From this perspective, the Digital Preservation Coalition Rapid Assessment Model (DPC-RAM), based on the DPCMM and used for this study, offers institutions a flexible yet impactful instrument designed to measure organizational readiness for digital preservation activities, available at http://doi.org/10.7207/dpcram24-03. Its format allows for the assessment of organizational capacities and service delivery capabilities within a framework informed by international best practices. The DPC-RAM is a flexible, technology-agnostic framework that can support strategic decisions and is designed for institutions of all sizes and sectors. The clarity of the assessment and the precision of the diagnosis allow for the establishment of realistic priorities, visualization of development paths, and advocacy for funding within their institutions. Thus, DPC RAM serves not only as a source of preliminary conclusions but also as a basis for routine audit activities, leading to efficient and sustainable digital preservation. (Digital Preservation Coalition Rapid Assessment Model (DPC RAM), 2024).

The structure of the DPC RAM model is organized into eleven dimensions, each with several questions. These questions are scored on a scale of 0 to 4, where zero means the organization has very little awareness of the capability, and four is the best situation for this part of the organization. The absence of minimal awareness is termed "future awareness" in the study, but this is outside the scope of DPC RAM. The term is used to facilitate participants' perception of opportunities for development and knowledge acquisition.

A traditional descriptive analysis of DPC RAM Model data is achieved through several statistical methods, including:

- Central tendency (measures to verify responses): Calculate the mean, median, and mode for each question in your survey to assess the central tendency of the responses to that question.
- Distributions: Calculate the standard deviation and range of responses for each question as a means of gaining an understanding of the variability among responses.
- Correlation analysis: evaluate the relationship between responses to different questions, to determine whether there is an association between different dimensions of the model.

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In this study, the DPC RAM model was used for 17 libraries and archives in the metropolitan area of Puerto Rico. The metropolitan area of Puerto Rico selected for the study consists of eight municipalities: San Juan, Carolina, Guaynabo, Bayamón, Dorado, Cataño, Trujillo Alto, and Toa Baja. The findings of this study not only offer insights into the strengths and weaknesses of the established dimensions but also provide a solid foundation for developing digital preservation strategies related to policies, resources, and technological infrastructure development. Therefore, this identification is a step in the right direction toward a more developed and sustainable digital preservation environment for our region.

General Objective

To evaluate the digital preservation capacity of 17 libraries and archives in the metropolitan area of Puerto Rico using DPC RAM, to produce a strategic assessment that supports institutional planning and promotes sustainable policies for digital content management.

Specific Objectives

1. To assess the level of maturity in Digital Preservation based on the organizational and service capabilities of institutions, including strengths and weaknesses across eleven dimensions of the DPC RAM model, and to provide a priority order for improvement.
2. Make strategic recommendations that inform policy development and support professional skills training and investment in technology to ensure digital resources are accessible and sustainable over the long term.

Capabilities

Organizational capabilities are fundamental to effective and lasting digital preservation, enabling the development of sound practices. They encompass structural, strategic, legal, technological, and community aspects. This set of capabilities in DPC RAM encompasses the sustainability of the organization in its governance and structure. Below is a detailed description of the categories included in the organizational capabilities according to the DPC RAM.

- Organizational viability: governance, organizational structure, staffing, and resourcing for digital preservation activities.

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- Policies and Strategies: Policies, strategies, and procedures that govern the operation and management of the digital archive.
- Legal and ethical aspects: Management of legal, social, and cultural rights and responsibilities, compliance with relevant regulations, and adherence to codes of ethics related to the acquisition, preservation, and access to digital content.
- Information Technology: Information Technology (IT) capabilities to support digital preservation activities.
- Continuous improvement: Processes for assessing current digital preservation capabilities, defining objectives, and monitoring progress.
- Community Engagement: Collaboration and contribution to the broader digital preservation community.

Service-oriented capabilities refer to operational processes related to content integrity and long-term availability. With respect to DPC-RAM, this includes systems for everything from receiving and incorporating content into a digital archive to implementing mechanisms that verify the technical correctness of bit streams. They also include semantic and functional preservation that ensures the materials continue to have meaning and value in the future. The categories listed in the service capabilities defined in DPC-RAM are described in detail below.

- Digital File Acquisition and Transfer: Processes for acquiring or transferring content and incorporating it into the digital archive.
- Bitstream preservation: Processes to ensure the storage and integrity of the digital content to be preserved.
- Content preservation: Processes for preserving the meaning, usability, and functionality of digital content over time.
- Metadata management: Processes for creating and maintaining sufficient metadata to support the preservation, search, and use of preserved digital content.
- Discovery and access: Processes that enable digital content to be found and provide access to users.

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Limitations

The main limitation of the study is the methodological approach to data collection. The empirical material for the study was based on interviews with archives administrators and/or archival technicians, and no rigorous technical studies or audits of policies or procedures were conducted. Therefore, the results are based on self-reported information and the subjectivity of the participants.

Evaluation Results

The application of the DPC-RAM allowed us to examine the maturity level of participating libraries and archives in terms of their organizational, technical, and service capabilities in digital preservation. The results are presented in two graphs: a comparative bar chart and a radar chart, which show the relationship between the expected level of maturity (4/4) and the current level achieved by the institutions in each dimension assessed.

Figure 1

General data in a radial graph of the expected level of maturity (4/4) and the current level reached by the institutions in each dimension evaluated.

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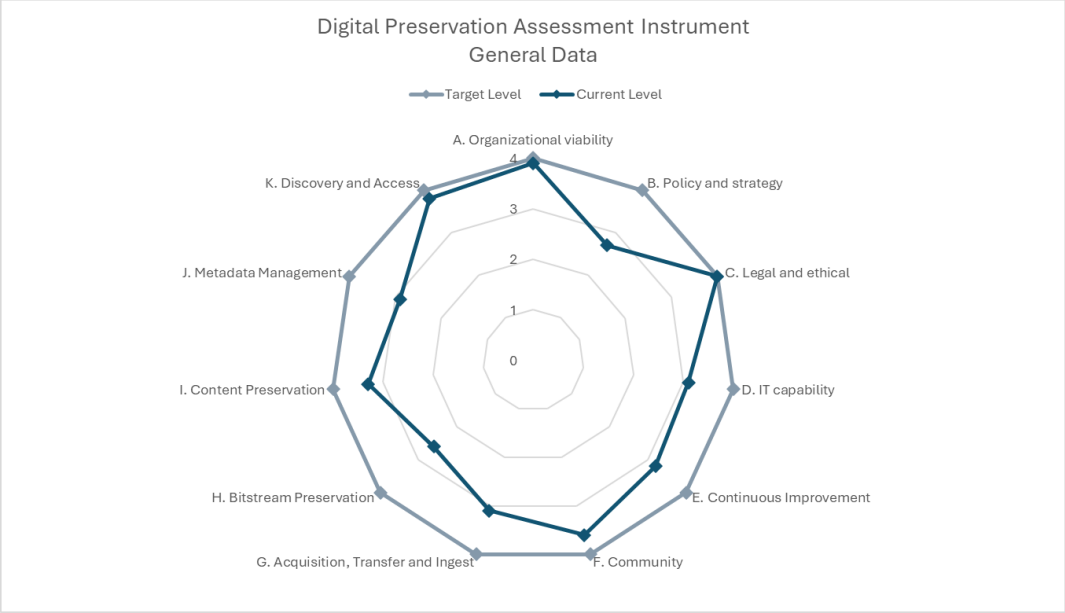
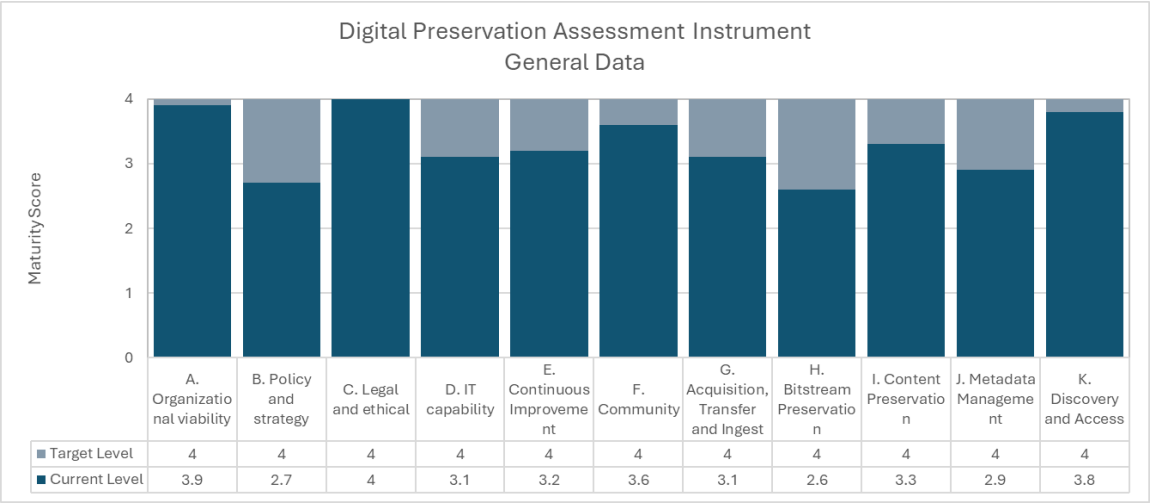


Figure 2

General data in a bar chart of the expected level of maturity (4/4) and the current level reached by institutions in each dimension evaluated.



	A. Organizational viability	B. Policy and strategy	C. Legal and ethical	D. IT capability	E. Continuous Improvement	F. Community	G. Acquisition, Transfer and Ingest	H. Bitstream Preservation	I. Content Preservation	J. Metadata Management	K. Discovery and Access
Target Level	4	4	4	4	4	4	4	4	4	4	4
Current Level	3.9	2.7	4	3.1	3.2	3.6	3.1	2.6	3.3	2.9	3.8

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Identified strengths

The data show that the institutions evaluated have a solid foundation in regulatory and governance aspects. In particular:

- **Organizational viability (3.9/4):** Most entities have institutional management structures that support digital preservation initiatives, in line with what is recommended by UNESCO (2021) in its *Guidelines for the Selection of Digital Heritage for Long-Term Preservation*.
- **Legal and ethical aspects (4/4):** Full compliance with regulatory principles is observed, which ensures that preservation projects respect copyright, confidentiality, and regulatory frameworks, following Documentary's recommendations. Heritage at Risk: Policy Gaps in Digital Preservation *(2021) by UNESCO*.
- **Discovery and Access (3.8/4):** Institutions show outstanding performance in the visibility and access to digital resources. That is, the social function of their collections and service to the academic community are aligned with the open access principles promoted by the research project " Improving Open Access Discovery for Digital Resources." OCLC's Academic Library Users (2024) examines how libraries can improve the retrieval of open-access content for their users.

Areas of opportunity

The analysis also reveals significant gaps that limit progress toward a sustainable digital preservation ecosystem:

- **Policy and Strategy (2.7/4):** The absence or weakness of clear institutional frameworks compromises the long-term sustainability of preservation programs. The OAIS model (ISO 14721:2025) emphasizes the need to define explicit policies to guide digital preservation.

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- **Metadata Management (2.9/4):** Although basic cataloging practices exist, robust and interoperable metadata schemes are not yet established. Standards such as PREMIS (Preservation of Metadata: Implementation Strategies) are essential to ensure traceability and authenticity over time (Library of Congress, 2017).
- **Bitstream Preservation (2.6/4):** This indicator represents the most significant vulnerability, pointing out the need to implement backup, replication, and integrity control strategies for digital files, in line with the audit practices of trusted repositories defined in ISO 16363:2025.

Intermediate results

In other dimensions, such as **community (3.6/4)**, **IT capacity (3.1/4)**, and **continuous improvement (3.2/4)**, the results reflect an intermediate level of maturity. Although inter-institutional collaboration efforts and self-assessment practices have been initiated, these still require strengthening to become consolidated and systematic processes, as promoted by *Digital Preservation.* DPC *Handbook (2015).*

Analysis of the Results

The study's results showed that these libraries and archives have already surpassed the intermediate level and are now at a medium-high level of maturity, considering aspects of digital preservation. Their progress in management and knowledge is also highlighted, which is a strength for fulfilling their role as academic or school graduates. However, there are still important technical and strategic issues that need to be addressed, such as the standardization of institutional policies, metadata management, and bitstream preservation.

These findings reflect a common trend in medium-sized institutions in Latin America and the Caribbean, where the availability of specialized technological and human resources is limited. However, there is a constantly growing organizational and regulatory commitment to digital preservation (Edit, Publish and Finance Science in Latin America, 2025b).

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Conclusions

The assessment conducted through the DPC-RAM confirms that the institutions interviewed are in the process of transitioning to higher levels of maturity in digital preservation. To achieve this goal, it is important to:

1. digital preservation **policies aligned with international standards (ISO 14721:2025, ISO 16363:2021).**
2. **Invest in technological infrastructure** that ensures the secure storage, integrity, and sustainability of digital archives.
3. **Strengthen staff technical skills** in metadata management and interoperability (e.g., use of PREMIS, METS, Dublin Core).
4. **Promote inter-institutional collaboration networks** that allow for the sharing of experiences, resources, and best practices, following models such as the *Digital Preservation Network*.

The findings suggest that the institutions have a solid organizational and legal foundation; however, progress is needed on technical and strategic aspects to ensure the resilience, sustainability, and long-term access of academic and cultural digital memory.

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