

Digital preservation at the APNOR Polytechnics in Portugal – Diagnosis of best practices, existing policies and needs: Creation of a proposal for a Digital Plan

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Abstract:

The possibility of creating a joint digital preservation plan for polytechnic higher education institutions, focusing on the polytechnics of the Association of Higher Polytechnic Institutes of the North Region-APNOR, namely: Instituto Politécnico do Porto, Instituto Politécnico de Viana do Castelo, Instituto Politécnico de Bragança and Instituto Politécnico do Cávado e do Ave, is an important and relevant challenge. Digital preservation is essential to ensure the integrity and accessibility of important data/information over time. Higher education institutions produce a large amount of digital data, such as academic records, work documentation, research papers, dissertations, etc., therefore it's urgent to ensure that institutional digital memory can be guaranteed in the long term and avoid the risks associated with data/information loss. In addition, polytechnic higher education institutions also have a social responsibility to guarantee that the digital heritage they produce is preserved for the benefit of society, this "study" proposes to assess the existing digital preservation policies in the mentioned institutions, as well as the identification of needs for the creation and/or implementation of new digital preservation policies/plan and challenges. The proposed methodology includes literature review and survey application to the responsible authorities of the institutions. Literature review will identify best practices and standards for digital preservation while the survey will collect information on existing policies and the institutions' needs for the creation and/or implementation of new policies. The aim is to present a digital preservation plan, contributing to the implementation and/or development of best practices to be applied to the universe studied.

Keywords: Digital transformation, Digital preservation, Digital preservation plan.

Digital Preservation

Digital preservation is defined as "the set of activities or processes responsible for ensuring continued long-term access to information and other cultural heritage existing in digital formats. Digital preservation consists of the ability to ensure that digital information remains accessible and possesses sufficient authenticity qualities to be interpreted in the future using a technological platform different from the one used at the time of its creation" (Ferreira, 2006, p.20).

Digital preservation refers to the practices and techniques used to ensure the accessibility and integrity of digital materials over time. With the increase in the production and storage of digital content, it has become essential to develop strategies to preserve these materials and prevent the loss of valuable information.

Some common principles and practices related to digital preservation are:

Format migration: Digital file formats can become obsolete over time, making it difficult or impossible to read them on modern systems. Format migration involves converting files to updated and widely supported formats, ensuring their continued readability.

Redundant storage: Digital materials should be stored in multiple locations and in different formats/media to reduce the risk of loss. This may include using servers, cloud storage systems, external hard drives, magnetic tapes, and other storage media.

Metadata and documentation: Proper creation and recording of metadata (descriptive information about digital materials) are essential for their preservation. Metadata helps identify, describe, and contextualize materials, facilitating their retrieval and future use.

Integrity verification: Regularly monitoring the integrity of digital materials is important to detect any corruption or data loss. Integrity verification tools can be used to ensure the files' integrity over time.

Technological updates: The rapid evolution of technology can make preservation systems and storage media obsolete. It is crucial to be aware of technological changes and regularly update preservation systems and practices to ensure continued compatibility and accessibility of digital materials.

Collaboration and sharing: Collaboration among institutions and organizations can be beneficial for digital preservation. Sharing knowledge, resources, and best practices helps develop more robust and effective solutions for preserving digital materials.

Copyright and privacy: When preserving digital materials, it is important to consider copyright and privacy issues. Ensuring compliance with laws and adopting measures to protect sensitive information are crucial elements of responsible digital preservation.

Digital preservation is a constantly evolving field, and it is essential to keep up with the latest practices and technological advancements. Additionally, it is recommended to follow guidelines established by specialized organizations such as the Digital Preservation Coalition (DPC) and the International Council on Archives (ICA), which provide comprehensive guidance on digital preservation.

Digital Preservation in Portugal

In Portugal, digital preservation has become a growing concern for cultural and governmental institutions, as well as private organizations. Several initiatives and policies have been put in place to promote digital preservation in the country. Since 2006, the Direção-Geral do Livro, dos Arquivos e das Bibliotecas (DGLAB), formerly the Directorate-General of Archives, has considered digital preservation a strategic priority due to high technological obsolescence and the increasing production of electronically produced documents, driven by the rapid pace of technological development.

Additionally, e-Government initiatives have led to an increased production of digital objects, which should have their evidential and authentic value preserved. Consequently, DGLAB has directed its efforts toward developing processes, tools, and resources capable of addressing the preservation needs of digital objects produced in the Public Administration and deemed to have continued preservation justification.

Collaboration between institutions has been emphasized to address the challenges of digital preservation, and various partnerships have been established, such as the Portuguese Network of Archives, the Portuguese Network of Digital Libraries, and the Network of Centers of Competence in Digital Technologies. However, it is important to emphasize that the field of digital preservation is constantly evolving and requires continuous efforts to keep up with technological advancements and international best practices.

Digital Preservation in Higher Education Institutions

Digital preservation in higher education institutions is essential to ensure the accessibility, integrity, and longevity of educational resources, research, and academic documents produced by these institutions. Some common practices of digital preservation in higher education institutions are:

Institutional repositories: where the academic community can deposit theses, dissertations, scientific articles, educational materials, and other types of academic productions.

Policies and guidelines: specific policies and guidelines for digital preservation.

Metadata and description: define metadata standards to ensure effective identification, description, and retrieval of digital resources.

Format migration: adopt format migration practices by converting digital materials to updated and widely supported formats.

Storage and backup: implement storage and backup strategies to protect digital resources.

Research data preservation: adopting policies and practices to ensure the integrity, documentation, and accessibility of research data produced by the institution's researchers.

Interinstitutional collaboration: share knowledge, resources, and best practices related to digital preservation.

Case study - Methodology

A structured questionnaire survey was used as a data collection instrument. This questionnaire survey aims to gather evidence about the existing practices and policies of digital preservation in the APNOR Polytechnics, as well as to identify the needs for creating and/or implementing new Digital Preservation Policies/Plans.

The target audience is the Polytechnics that are part of the Association of Polytechnic Higher Education Institutions of the Northern Region (APNOR), specifically the Instituto Politécnico do Porto, Instituto Politécnico de Viana do Castelo, Instituto Politécnico de Bragança and Instituto Politécnico do Cávado e do Ave.

Objectives

This investigation is expected to contribute to the knowledge of existing Digital Preservation Policies in the APNOR Polytechnics, as well as to identify the needs for creating and/or implementing new Digital Preservation Policies/Plans.

Characterization of the Study Universe

The Association of Polytechnic Higher Education Institutions of the Northern Region (APNOR) was established on May 15, 1999.

The four institutions created the opportunity to benefit from their size and the economies of scale it provides. Above all, they created the opportunity to be part of an integrative project, geographically diverse and multidimensional, focused on education, the production and dissemination of knowledge, the provision of specialized services, science, and culture, in the pursuit of better living conditions for their people and better regional and national development.

By the will of its current leaders and in line with the intentions and purposes of its founders, APNOR is increasingly assuming a prominent role in the dynamization of the Polytechnic Higher Education subsystem in the region and the country.

APNOR is composed of four Polytechnic Higher Education Institutions: the Instituto Politécnico do Porto (composed of 8 schools), the Instituto Politécnico do Cávado e Ave (composed of 5 schools), the Instituto Politécnico de Bragança (composed of 5 schools), and the Instituto Politécnico de Viana do Castelo (composed of 6 schools).

Results

Out of the four institutions, the largest number of responses came from the district of Viana do Castelo, followed by Porto, Barcelos, and finally Bragança, as shown in the graph below:

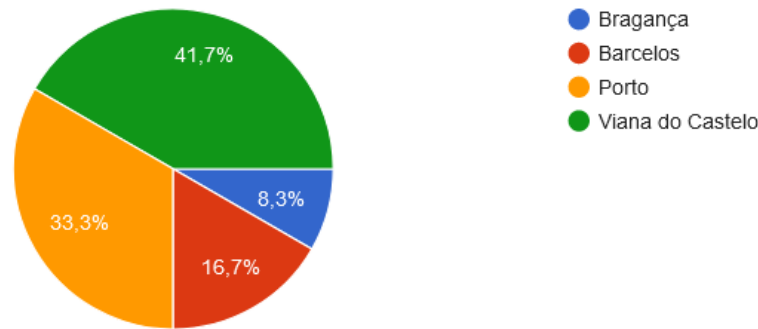


Figure 1 - Number of responses per district

The majority of institutions do not employ specialized staff for electronic or digital records (91.7%), and in most cases, those responsible for these types of records are other librarians, other archivists, or IT personnel.

A considerable percentage of participants indicated a lack of knowledge or uncertainty regarding various issues, such as the number of staff responsible for digital preservation, the existence of written policies, and practices for processing born-digital records.

The types of born-digital records preserved in the institutions are diverse, including text files, research data, Excel files, databases, emails, institutional websites, photographs, software, among others. This diversity highlights the need for adaptable policies and practices to deal with the preservation of different types of digital records.

Digital storage is mainly done in network file systems supported by IT, followed by local/attached storage and cloud storage. Most institutions do not use geographically dispersed storage for the preservation and access of born-digital records. This indicates that there is room to explore more robust and resilient storage strategies.

Based on the questionnaire results, it can be concluded that there are some significant challenges for the preservation of born-digital records in the APNOR Polytechnics:

1. **Lack of personnel:** The majority of participants (91.7%) identified the lack of personnel as a challenge for digital preservation. This suggests that there is a shortage of dedicated human resources for preservation activities, which can affect the ability to implement and maintain effective policies in this area. Only 8.3% of respondents stated that they have a specialized archivist in electronic or digital records with the primary responsibility of acquiring, preserving, and providing access to born-digital records. The responsibility for born-digital records is attributed to other librarians (54.6%) or archivists (27.3%). Most respondents indicated that they have few or no staff responsible for full-time equivalent (FTE) acquisition, assessment, preservation, and access to born-digital records, and a significant percentage indicated that they do not

know how many staff members are responsible for these tasks. None of the respondents considered the number of collaborators to be very or extremely adequate, suggesting a perceived need for additional human resources to ensure proper management of digital data.

2. Lack of policies and procedures: A significant percentage of respondents do not have established practices for creating accession records, transfer records, forms, purchase contracts, or other types of incorporation documents specifically for born-digital records. Half of the respondents indicate that they do not have formal written policies for managing born-digital records. A significant percentage of respondents (33.3%) do not apply procedures for managing born-digital records.
3. Lack of funding: Two-thirds of the participants (66.7%) identified a lack of funding as a challenge. Digital preservation requires investments in infrastructure, technology, and resources, such as servers, specialized software, and staff training. The lack of financial resources can hinder the implementation of adequate preservation measures.
4. Lack of experts: The same proportion of participants (66.7%) mentioned a lack of experts as a challenge. Digital preservation requires technical knowledge and specific skills to ensure that records are stored and maintained appropriately over time. The absence of qualified experts in this area can limit the effectiveness of preservation policies.
5. Coordination among stakeholders: Half of the participants (50%) indicated that coordination among stakeholders is a challenge. The lack of effective coordination among these parties can make it difficult to implement comprehensive preservation policies and plans.
6. Absence of top-level decision-making: A minority of participants (8.3%) mentioned that the lack of top-level decision-making defining these policies is a challenge. This suggests that there is no clear guidance or leadership regarding digital preservation policies in the APNOR Polytechnics. High-level decision-making is important to establish clear guidelines and priorities in this area.

These identified challenges highlight the need for concrete actions to improve digital preservation policies in the APNOR Polytechnics. It is essential to invest in human resources, adequate funding, and expertise, as well as promote coordination among stakeholders and establish clear leadership to drive the development and implementation of effective digital preservation policies.

On the other hand, the strategies considered necessary to address the identified challenges are as follows:

1. Collaboration: The majority of participants (83%) indicated that collaboration is an important strategy. This means that involving more people and teams in digital preservation can help mitigate the lack of personnel and expertise mentioned earlier. Collaboration may involve sharing resources, knowledge, and responsibilities to strengthen preservation efforts.
2. Funding: Approximately 75% of participants pointed to funding as a necessary strategy. This highlights the importance of ensuring adequate financial resources to support digital preservation activities. Adequate funding can enable investments in the necessary infrastructure, technology, expertise, and personnel training to implement and maintain effective preservation policies.
3. Tools and services: Similarly, about 66.7% of participants mentioned that access to appropriate tools and services is a necessary strategy. This indicates the importance of

having specialized technologies and services to aid in digital preservation. This may include data management tools, digital archiving systems, cloud storage services, and other technological solutions that facilitate long-term preservation.

4. Outreach, dialogue, and collaboration: Approximately 58.3% of participants consider outreach, dialogue, and collaboration as important strategies. This implies that effective communication and collaboration among different stakeholders, including researchers, IT professionals, archivists, and administration, are fundamental to address the challenges of digital preservation. Sharing knowledge, exchanging ideas, and establishing partnerships can contribute to the implementation of more robust preservation policies and plans.
5. No additional strategy indicated: A small proportion of participants (8.3%) indicated that no additional strategy is needed. This may suggest that they believe the strategies already mentioned are sufficient to address the identified challenges.

Collaboration, adequate funding, access to specialized tools and services, as well as outreach, dialogue, and collaboration among stakeholders are strategies considered necessary to address the challenges of digital preservation in the APNOR Polytechnics. These strategies should be implemented together to strengthen digital preservation policies and plans and enhance the capacity of the Polytechnics to deal with the identified challenges.

Results

Analyzing the provided data, we can conclude that the majority of institutions do not have a specialized archivist in electronic or digital records responsible for the acquisition, preservation, and access to such records. Instead, other librarians, archivists, or IT professionals are assigned to this role. Additionally, many institutions have only one staff member dedicated to these activities or are unaware of the exact number of staff involved. This indicates a lack of expertise and dedicated human resources for the preservation of born-digital records.

It was also found that most participants consider the current number of collaborators inadequate to support the preservation of born-digital records. This highlights the need to increase the number of qualified professionals dedicated to these activities to properly address the challenges of digital preservation.

A significant percentage of institutions do not have formal written policies for activities related to managing born-digital records, such as restrictions/personal data, digital storage, access, evaluation, description/arrangement, metadata creation/capture, and acquisition/incorporation. This indicates a lack of clear and consistent guidelines for these activities. Additionally, a considerable portion of institutions do not apply procedures for some activities related to managing born-digital records, which may affect the effectiveness and consistency of these practices.

It was observed that a variety of tools are used for the acquisition, processing, preservation, and access of born-digital records, including a combination of open-source, proprietary, and internally developed solutions. DSpace is the most commonly mentioned tool for acquisition, incorporation, preservation, and access. Furthermore, access to born-digital records is predominantly conducted online, through digital library systems.

The most common challenges identified include a lack of personnel, lack of funding, lack of experts, and lack of coordination among stakeholders. The strategies considered necessary to address these challenges include increasing staff, securing adequate funding, adopting appropriate tools and services, and promoting outreach, dialogue, and collaboration among stakeholders.

In summary, the results highlight the need for investment in specialized human resources, the development of clear policies and procedures, the use of appropriate tools, and effective collaboration among stakeholders to address the challenges of preserving born-digital records in the surveyed institutions.

Final Conclusion and Future Work

Based on the data analyzed in this survey, it is evident that the Polytechnics of APNOR face significant challenges in the preservation of born-digital records. The lack of specialized personnel, insufficient funding, coordination among stakeholders, and the absence of formal policies and procedures are issues that need to be addressed to ensure the effective preservation of these records.

The creation of digital preservation policies and plans emerges as a necessary response to these challenges. These policies should establish clear guidelines for the acquisition, evaluation, preservation, and access of born-digital records, as well as define responsibilities and allocate adequate resources. Additionally, it is crucial to promote collaboration among the APNOR institutions, sharing knowledge and resources to collectively address common challenges.

The need for specialized human resources and adequate funding is fundamental to the successful implementation of digital preservation policies. Institutions should prioritize the training of specialized teams and seek the necessary financial support to ensure the long-term preservation of born-digital records.

The lack of formal written policies and procedures reveals a significant gap that needs to be filled. These documents are essential to provide clear and consistent guidance on digital preservation practices, ensuring the adoption of standardized approaches and best practices across all APNOR institutions.

In conclusion, the creation of digital preservation policies and plans is crucial to address the challenges identified in this study at the Polytechnics of APNOR. These policies should be developed based on data and the specific needs of each institution, prioritizing adequate resources, collaboration among stakeholders, and the implementation of best practices, with information professionals, such as archivists specialized in Digital Preservation, being central elements. That is, it is necessary to produce technical and normative documents that assist institutions in understanding, managing, and developing tools that enable the preservation of their digital objects. By adopting appropriate preservation measures, APNOR institutions can ensure the long-term integrity and accessibility of born-digital records, thereby safeguarding their valuable digital heritage for future generations. In this regard, we suggest the Recommendations for the production of Digital Preservation Plans (2nd version); Data Collection Sheets (Digital Preservation Plan), indicated by DGLAB. Similarly, the development of a digital archive with the capacity to integrate, manage, and disseminate digital

objects produced in the Public Administration is important. In this domain, the Repository of Authentic Digital Objects (RODA) is indicated, as a national digital archive with the ability to integrate, manage, and disseminate digital objects produced both by the Public Administration and other producers who wish to preserve digital information for future memory. The Polytechnics of APNOR could benefit from it to explore common resources.

According to the Recommendations for the production of Digital Preservation Plans (DPP), it should be a strategic document with policies and procedures aimed at establishing a technical, procedural, and organizational structure that allows preserving information through actions carried out on the information systems and digital objects that compose it, maintaining the attributes considered indispensable. Thus, to maintain the integrity and usability of information over time, it should identify the form and functionalities that must be implemented, identify preservation procedures for each selected system, creating the respective workflow, as well as identifying those responsible (individuals and/or services) for executing, monitoring the application of these processes, and self-assess the adequacy of the technological platform for digital preservation purposes. Thus, the development of a digital preservation plan and the selection of appropriate strategies and solutions should result from a collaborative effort between the organizational unit responsible for the archive and information technology, with the participation of all organizational units affected by the process or that produce digital information. As future work, we propose the creation of a joint plan with the following structure:

1. Analysis of Challenges and Needs
 - Summary of the results of the questionnaire conducted at the Polytechnics of APNOR
 - Identification of the main challenges faced by the institutions
 - Description of specific needs in terms of personnel, funding, coordination, and policies/procedures
2. Objectives and Principles of the Digital Preservation Plan
 - Definition of the overall objectives of the plan
 - Establishment of guiding principles for digital preservation in APNOR
3. Organizational Structure and Responsibilities
 - Definition of roles and responsibilities of stakeholders involved in digital preservation
 - Allocation of adequate human and financial resources to support preservation activities
4. Digital Preservation Policies
 - Development of formal written policies for the acquisition, evaluation, preservation, and access of born-digital records
 - Definition of guidelines for restrictions/personal data, digital storage, access, evaluation, description/arrangement, metadata creation/capture, acquisition/incorporation, and other relevant aspects
5. Digital Preservation Procedures
 - Establishment of clear and documented procedures for preservation activities, including storage, migration, authentication, backup, and other processes

- Definition of the level of description at which metadata is captured during the acquisition and incorporation of born-digital records
6. Technological Infrastructure and Tools
 - Identification of tools and resources necessary for the acquisition, processing, preservation, and access of born-digital records
 - Evaluation of available solutions, such as digital content management systems, institutional repositories, and other relevant technologies
 7. Collaboration and Resource Sharing
 - Promotion of collaboration among APNOR institutions for resource sharing, knowledge exchange, and best practices
 - Establishment of networks of cooperation and partnerships with other relevant institutions and organizations
 8. Training and Awareness
 - Development of training and education programs for professionals involved in digital preservation
 - Awareness-raising about the importance of preserving born-digital records among the academic community and other stakeholders
 9. Evaluation and Monitoring
 - Establishment of indicators and metrics to assess the effectiveness of the digital preservation plan
 - Continuous monitoring of preservation activities, periodic review of the plan, and implementation of improvements as needed
 10. Ethical and Legal Considerations
 - Adherence to ethical and legal guidelines related to the preservation of born-digital records, such as personal data protection and copyright rights
 11. Implementation and Schedule
 - Definition of a detailed plan for the implementation of the digital preservation plan, including a realistic timeline and required resources
 12. Final Considerations
 - Emphasizing the continuous importance of digital preservation as an essential component of information management in APNOR institutions
 - Highlighting the need for ongoing commitment and collaboration to ensure the sustainability of the digital preservation plan.
 - The need to develop a document management policy

The decision to develop a Digital Preservation Plan (DPP) should be considered in conjunction with other information management instruments, such as the development of Classification Plans and Selection Tables/Document Management Policies. Additionally, they should be structured with other projects in the archive field or technology platform, including the implementation of information security according to ISO 27000 or a quality implementation process according to ISO 20000. There are also normative texts and technical

guidelines that can provide information to help the Polytechnics of APNOR find the best preservation options. Besides these considerations, DGLAB offers RODA as an open-source digital preservation system, providing institutions with a solid application base or a starting point for developing tailored solutions.

Currently, it is imperative to create conditions to safeguard, enhance, and recover digital information, as it is the most valuable organizational asset.

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