DIGITAL PRESERVATION AND ACCESSIBILITY OF ARCHIVES IN OMAN:

Current Status and Future Directions

Ahmed Maher Khafaga Shehata
Sultan Qaboos University
Oman
a.shehata@squ.edu.om
https://orcid.org/0000-0002-5447-5867

Abderrazak Mkadmi
Sultan Qaboos University
Oman
a.mkadmi1@squ.edu.om
https://orcid.org/0000-0002-5621-2235

Abstract – Digital preservation significance is widely recognized and imperative for all institutions. It is a pressing concern for archival specialists who acknowledge its relevance and necessity in contemporary information management practices.

The current paper aims to examine the present state of digital preservation and Accessibility of institutional archives in Oman and to ascertain the challenges and prospects in this domain. This research is conducted through a comprehensive analysis of the extant literature and semi-structured interviews with administrative personnel employed in ~~both~~ public ~~and private~~ institutions in Oman. Semi-structured interviews were conducted with ten professionals in governmental organizations, who were chosen based on their expertise and experience in the field, using purposive sampling.

The findings showed that interviewees in Omani institutions value digital preservation for many reasons, such as compliance with Omani law on archives, improved organization and security, and ease of document access. However, all institutions have no unified application strategy for digital preservation. The findings revealed many challenges, including technological obsolescence, security risks, big data management, and human resource challenges.

Keywords – Digital preservation, Oman, Institutional archives, Information management, Accessibility

Conference Topics – DIGITAL ACCESSIBILITY, INCLUSION, AND DIVERSITY.

I. INTRODUCTION

Digital preservation and accessibility are increasingly important issues in the digital age, as the volume of digital content continues to grow and the reliance on digital technologies increases. In Oman, the adoption of digital technologies in a range of sectors, including education, business, and cultural heritage, has brought both opportunities and challenges for preserving and accessing digital information and materials.

Recent research has highlighted the importance of digital preservation in Oman for ensuring the long-term accessibility and usability of digital content (Aboraya et al., 2021). However, the country faces many challenges in this area, including limited technical infrastructure and expertise and a lack of standardization and interoperability among digital systems (Mehta & Hemmy, 2021). These challenges can make it difficult to preserve and access digital content over time and can hinder the ability of

iPRES 2023: The 19th International Conference on Digital Preservation, Champaign-Urbana, IL, US.

https://hdl.handle.net/2142/121098

Omani organizations to take full advantage of the benefits of digital technologies.

Digital accessibility is also important in Oman, enabling individuals to participate fully in the digital world (Lucchi, 2013). However, a lack of awareness and understanding of the needs of people, as well as a lack of accessibility standards and guidelines, can make it difficult to access and use digital content and services (Elnaggar, 2008; Hadidi & Al Khateeb, 2015; Kulkarni, 2019).

This conference paper aims to explore the current status of digital preservation and accessibility of archives in Oman and identify the challenges and opportunities in this area, through a review of the existing literature and semi-structured interviews targeting administrative staff working in public and private Omani institutions.

II. LITERATURE

Digital Preservation in Oman

Research on digital preservation in Oman has identified several challenges and opportunities in this area. Studies found that limited technical infrastructure and expertise and a lack of standardization and interoperability among digital systems are among the key challenges facing digital preservation in Oman. These challenges can make it difficult to preserve and access digital content over time and hinder Omani organizations' ability to take full advantage of the benefits of digital technologies (Al Hinai, 2016; Al Mughairi; Mehta & Hemmy, 2021).

Regarding opportunities, Al Hinai (2016) and Aboraya et al. (2021) identified the potential for digital preservation to support the digitization of cultural and heritage collections in Oman and improve the efficiency and effectiveness of government and business operations. However, they also emphasized the need for stronger policies and regulations to support digital preservation in the country and for greater investment in technical infrastructure and expertise.

In addition, digital preservation poses, according to (Mkadmi, 2021), several organizational, technical, legal, normative and strategic challenges. Technological obsolescence remains one of the main problems of information preservation and durability. And it is in this sense that archivists are called upon today and more than ever to find the necessary strategies for cooperation with other information professionals, namely computer scientists, lawyers, data analysts, auditors, etc., to emphasize both the preservation and the accessibility of the documents. Also at the normative level, the challenges are enormous, given the explosion on the one hand of standards in this field related to description, preservation, and accessibility and, on the other hand, the variety of documents to be preserved, which requires each a different strategy, while also putting in mind that other standards in other areas are also involved in this process, namely those of quality, computer security, human rights, etc.

Internationally, digital preservation has been recognized as an important issue for preserving and accessing digital content over time (Lee et al., 2002). Research has identified a range of challenges, including the need to ensure the authenticity and integrity of digital materials, the need to migrate digital content to new formats and technologies as they become obsolete, and the need to manage and store digital content in a way that ensures its long-term accessibility(Galyani Moghaddam, 2010; Gaur & Tripathi, 2012). Several approaches have been proposed to address these challenges, including using digital preservation frameworks and standards, developing digital preservation policies and strategies, and establishing digital preservation repositories and infrastructure (Becker et al., 2009; Masenya & Ngulube, 2020).

Digital Accessibility in Oman

Research on digital accessibility in Oman has highlighted the importance of this issue for enabling individuals with disabilities to participate fully in the digital (Abanumy et al., 2005; Al Sulaimani & Ozuem, 2022). However, the literature has also identified several challenges that can make it difficult for people with disabilities to access and use digital content and services in Oman. Studies found that a lack of awareness and understanding of the needs of people with disabilities, as well as a lack of accessibility standards and guidelines, are among the key barriers to digital accessibility in the country (Abanumy et al., 2005; Al Sulaimani & Ozuem, 2022).

Internationally, digital accessibility has been recognized as an important issue for ensuring that all individuals can access and use digital content and services (Jaeger & Xie, 2009; Valtolina & Fratus, 2022). Research has identified a range of approaches for promoting digital accessibility, including the

development of accessibility standards and guidelines, the design of inclusive digital products and services, and the use of assistive technologies to support the needs of people with disabilities (Kulkarni, 2019). To support digital accessibility, many countries have implemented laws and regulations requiring digital content and services to be accessible to people with disabilities (Lazar et al., 2015; Oliveira et al., 2020).

Despite these efforts, digital accessibility remains a challenge in many countries, including Oman. Research has identified a range of barriers to digital accessibility in Oman and Arab countries, including a lack of awareness and understanding of the importance of accessibility, a lack of trained professionals and experts in the field, and a lack of resources and infrastructure to support accessibility efforts (Mkadmi, 2021). Additionally, the rapid pace of technological change can make it difficult to keep up with the latest accessibility standards and practices. The lack of interoperability between different technologies can create additional barriers for people with disabilities (Kulkarni, 2019; Lewthwaite & James, 2020).

To address these challenges, it is important to adopt a holistic and inclusive approach to digital accessibility in Oman. This could involve a range of strategies, including the development of accessibility standards and guidelines, the design of inclusive digital products and services, the use of assistive technologies, and the implementation of laws and regulations to support accessibility efforts. By taking these steps, we can work towards ensuring that all Oman individuals can fully participate in the digital world.

2. THE STUDY SIGNIFICANCE

Digital preservation and accessibility importance has been widely acknowledged in Oman and internationally. In Arab countries, digital preservation has created numerous opportunities and challenges explored in previous research (Abubaker et al., 2015; Awamleh & Hamad, 2022). However, some gaps in the existing literature still need to be addressed to achieve more inclusive and equitable outcomes.

One area that requires further investigation is the impact of digital preservation and accessibility in Oman. There is a need for more in-depth studies on how digital technologies can benefit people to access archives and digital content. Understanding the challenges and opportunities of digital accessibility and preservation can help identify effective strategies for promoting access to information rights. Additionally, more research is needed on how digital technologies can promote cultural inclusivity and diversity in Oman.

3. AIMS

- Highlight the importance of digital preservation and accessibility in Omani institutions.
- Identify the challenges and opportunities of digital preservation of documents and ways to access them in Omani institutions.
- Explore the potential future directions for digital preservation and accessibility in Oman, including emerging technologies and best practices that could help to ensure the long-term accessibility of digital content.

4. METHODOLOGY

To explore the current status of digital preservation and accessibility in Oman, we conducted semi-structured interviews with ten experts from ten Omani organizations. Our sample consisted of government r professionals, who were chosen based on their expertise and experience in the field using purposive sampling.

Table 1: Sample Details

Participant	Organization	Sector	Gender
1	Amman Airports	Government	Male
2	Oman Air	Government	Male
3	The General Secretariat of Tender Board	Government	Male
4	Ministry of Social Development	Government	Female
5	Anonymized	Government	Male
6	Environment Agency	Government	Female
7	Ministry of Justice and Legal Affairs	Government	Male
8	Omani Board of Medical Specialties	Government	Male
9	Ministry of Endowments	Government	Male

	and Religious Affairs		
10	Namaa Holding	Government	Male

1. Data Collection and Analysis

The interviews were conducted in person by a research assistant specializing in digital Archives and lasted approximately 45 minutes each. The semi-structured interviews followed a set of guiding questions but also allowed for flexibility and exploration of additional topics that emerged during the interview. We recorded and transcribed the interviews for analysis. The interviews were in the Arabic language and then were translated into English.

We used thematic analysis to analyze the data from interviews, in which themes and patterns were identified and coded across the interview transcripts and grouped. This allowed us to explore the perspectives and experiences of our participants and gain insights into the current status of digital preservation and accessibility in Oman.

2. Limitations

One limitation of our study is the small sample size, which may not represent the variance of perspectives and experiences of all experts in digital preservation in Oman. Additionally, our interviews were conducted with professionals working in specific sectors and organizations, and therefore, the findings may not be generalizable to other sectors or organizations. However, our study provides valuable insights into the current digital preservation and accessibility practices in Oman and offers a starting point for further research.

5. ANALYSIS

Importance of digital preservation

Regarding identifying the importance of digital preservation in Omani institutions, most respondents were well aware of what digital preservation is and its importance in business management, document control and retrieval when necessary. This is because most of the respondents have academic training in document management. and archives and they consider digital preservation as part of their job duties, which have absolute priority, in line with the speed and flow of documents in digital form. The respondent, A2, considered that "digital preservation helps in speedy retrieval of information in a timely manner, centralization of preservation, and provision of spaces occupied by paper documents. It also enables rapid sharing of information and greater confidentiality of information." In the same context, most respondents expressed their strong awareness of the importance of digital preservation as the best way to bypass spatial and temporal requirements (A5), as it enables the institution to facilitate access to documents at all times and from all places. It also allows more than one employee to access the same document, which avoids frequent copying of files, thus reducing operational costs (A4). However, one of the respondents (A6) considers that digital memorization is still somewhat recent in institutions and has started with the beginning of using e-mail (Outlook) as an official means of communication, which provides, in addition to messaging, other functions related to the calendar, task management, contacts, note-taking, and journal logging. This last respondent stated, "Before establishing archives departments in institutions, there was no digital preservation. The beginning of circulation of documents in digital form was since the institution adopted e-mail (Outlook) as an approved means of correspondence within the institution. The management and preservation of digital records is still new to us."

In addition, the interviewees highlighted the importance of digital preservation in organizing and securing documents, especially since it was based on the archival tools prepared by the National Records and Archives Authority (NRAA), which is particularly represented in the document classification system and the Records retention schedules. Thus, (A8) considered that the process of "preserving digital files in the institution with organized and systematic applications linked to the classification system and schedule of retention periods of the NRAA contributes significantly to the rationalization and governance of document organization and retrieval processes." In this context, (A9) also expressed that digital preservation does not include preserving documents from loss but should also focus on protecting media and containers from the factors affecting them.

Digital preservation process

When we were asked how the digital preservation process takes place, whether it is

carried out at the level of the institution or outside it or by adopting cloud computing, the answers were mixed. Most of the respondents mentioned that the archiving process takes place mostly inside the institutions, and sometimes it takes place in addition to that in cloud computing applications and other times in the servers of the ministry or institutions specialized in digital preservation outside the institution. A1, A2, A3, A5, and A9 mentioned that digital preservation is done on internal servers under the direct responsibility of the organization. In contrast, A2 and A3 mentioned that some documents are saved in cloud computing and internal archiving, citing Microsoft applications in this regard. On the other hand, A4 mentioned that the new direction is to work on finding a system that matches the standards of the NRAA, as he stated that "the archives department is trying, in its meetings with officials in the ministry, to persuade those concerned to implement a new system that is more compatible with the standards of the NRAA." In the same context, A8 also stated that it will "work on an electronic document management program in future, and it will be compatible with the standards of the NRAA." A6 also confirmed that the "Woussoul[1]" system prepared by the NRAA would soon be approved, which depends on the preservation policy on national cloud computing that will be concentrated within the Sultanate (in the Information Technology Authority in the Knowledge Oasis). However, A10 considers that digital archiving is still in its infancy, and there is no clear strategy for this purpose except for e-mail archiving.

Digital preservation strategy, tools and standards used

We believe the digital preservation process must be subject to a clear technical and administrative strategy. There must be an advanced technical structure that is subject to standards and specifications that guarantee the governance of documents and the speed of their retrieval while preserving their confidentiality, comprehensiveness and authenticity throughout the preservation period in the institution, as well as when implementing their final fate either by deporting them to the NRAA or by destroying them in accordance with the conditions and standards related to destruction. Therefore, our first question in this section is related to the existence of strategies and evidence on which digital preservation is based. The answers seemed to be distinct as well. Where more than half of the respondents (A4, A5, A7, A8, and A9) expressed the absence of a clear strategy and policy with regard to saving and securing data, and if there are some rules, then the information technology department alone follows up on that, without referring to the departments of documents management. In this regard, A4 stated, "There is no specific policy for keeping these files for the long term. With regard to risk management, data preservation and Backup, it is the responsibility of the information systems departments. The documents management department does not have into the process of signing the system contract. We have no idea about these operations and system updates". At the same time, the rest of the respondents (A1, A2, A3 and A6) confirmed that the digital preservation process is subject to many procedures issued in the form of circulars and regulations by the relevant ministry and also by the Information Technology Authority and the Electronic Defense Center, where A3 stated that "it is following several procedures in the preservation process with regard to digital preservation, the circulars, policies, standards and regulations issued by the Ministry of Transport, Communications and Information Technology and the Electronic Defense Center are followed. For example, at the level of digital preservation on cloud computing, reliance is placed on the "cloud computing policy first" and the cloud computing governance framework".

As for the technological tools used in the digital preservation process, they are summarized, according to the respondents, in computers and databases within the electronic correspondence system, scanners, electronic sharing files, as well as photocopiers and servers for data preservation.

Specifications or standards of the digital preservation process was our third question in this section, by which we mean standards related to quality, metadata, structure, file formats, digitization, encryption, and standards related to access, including for people with special needs, etc. The answers to this question also ranged between positive and negative, as each of A1, A2, 3, and A5 confirmed that the archiving process is subject to

[1] Woussoul (which means "access "in English) is the name of the "EDRMS" system which is developed by NRAA to generalize it thereafter to all the institutions concerned by the Omani law of archives.

standards related to metadata and file formats as well as to data encryption and that most of these standards were partially included in procedures guides developed by NRAA such as The National Guide to electronic documents and records management as well as by the Ministry of Transport, Communications and Information Technology. However, most of the respondents, including those who declared the existence of standards, did not provide details about the extent of the application of these standards or their contents. This is because only information technology employees deal with these issues and ensure their implementation.

Challenges of Digital preservation

It was found that digital preservation brings forth many challenges. One of the foremost challenges is technological obsolescence, which leads to electronic systems and information resources becoming outdated over time, thus making it difficult to use and fully leverage their potential. As expressed by Interviewee A7, "All electronic systems and information resources are subject to obsolescence, and their use becomes limited over time due to changes in programs and modern devices in the contemporary era, leading to difficulties in their utilization and optimal exploitation." Therefore, keeping up with modern changes, programs, and technologies is essential to overcome this challenge. In addition, digital preservation depends on the system developer rather than the institution, making renewing contracts critical in ensuring its maintenance over time.

Another significant challenge is security, as there is a risk of hacking, stealing, or erasing data, necessitating adherence to current security policies issued by relevant security authorities. Interviewee A7 emphasized the importance of "modern policies in the security of electronic documents and information issued by the security authorities such as the National Authority for cyber defense" and highlighted the Information Security Department's responsibility to ensure data safety. Other challenges include difficulty processing the increasing volume of data and the high flow of information, requiring expertise in information technology, high storage capacity requirements, and risk management for maintaining servers. Updates to the systems may also be unsuitable and not aligned with the nature of the data stored in old systems (A1).

Institutional and organizational challenges are apparent in the process of digital preservation. These include the presence of contracts with external companies, the lack of policies and guidelines to support the integration of documentation specialists with those in charge of digital preservation, and a shortage of specialized expertise in managing digital preservation, as Interviewee A3 pointed out, absence of policies that support specialists in integrating with those charged with digital preservation. Also, the resignation of expertise specialized in managing digital preservation." In addition, financial documents cannot be managed in digital form, which can lead to difficulties in understanding the context of the document for staff, as Interviewee A5 highlighted. Furthermore, the complexity of document management systems and the changing file formats and sizes present further challenges, necessitating regular hardware updates. Access to the system should be limited to the organization to avoid the risks associated with using systems outside the organization's scope.

Human resource challenges, such as job instability, the failure to manage systems and the ambiguity of digital preservation standards, were also identified through the interviews (Interviewees A7 and A9, respectively). Overcoming these multifaceted challenges will require careful consideration of technical, security, institutional, and human factors. Ensuring effective and long-term preservation of digital documents will depend on addressing these challenges.

Opportunities of digital preservation

The interviews shed light on the potential benefits of digital preservation and the challenges it presents. According to the interviewees, digital preservation offers several opportunities, such as improved administrative memory, streamlined document sharing, and collaboration on the same file. The possibility of monitoring and auditing by many users was also highlighted (A2), as well as the potential to exploit all the advantages of digital technologies in processing, describing, and organizing data. Furthermore, digital preservation was essential for linking administrative institutions, facilitating services provision, and developing electronic and smart governments (A1).

According to Interviewee A3, digital preservation provides opportunities to support financial and administrative oversight inside and outside the institution, enhance project management, and improve spending efficiency. The presence of digital data and documents enables the acquisition of reliable decisions and reports and facilitates monitoring and following up on government projects. The interviewees also mentioned other advantages of digital preservation, such as lower space storage costs and easier data updates (A3).

In addition, the interviewees highlighted the benefits of easy and quick access to documents and files, which supports government efforts in improving services and enables institutional participation in administrative work. The accuracy, ease, and speed of file retrieval were also emphasized (A5 and A6).

Overall, the interviews suggest that digital preservation offers a range of potential benefits regarding data management, project management, and government services. Such benefits can be realized by overcoming the challenges posed by digital preservation, including technological obsolescence, security risks, big data management, high storage requirements, and human resource challenges. Addressing these challenges will be critical in ensuring an effective and long-term preservation of digital documents.

Future directions for digital preservation and accessibility in Oman

The data from the interviews indicate that the presence of a strategy for digital preservation in the organizations varied among the participants. While some organizations had a specific plan and strategy for digital preservation, others did not have a strategy in place.

Participants A1 and A2 confirmed that their organizations have plans to acquire a system for managing documents and electronic documents, which will be compatible with the standards of the NRAA. Participant A4 mentioned the general trend in the Sultanate to contract with the "Woussoul" program licensed by the Omani government, which is an integrated system for all institutions in handling digital files. Participants A5 and A6 acknowledged that the government's approach, through the launch of the government document management system (Woussoul), will lead to strong digital preservation in the future, which requires the development of special strategies to keep up with technological developments. Participant A8 also mentioned that their organization has a digital transformation team, indicating that the organization is taking steps towards digital preservation.

On the other hand, some participants noted the lack of a strategy for digital preservation in their organizations. Participants A3 and A7 confirmed that there is currently no strategy for digital preservation, but work is underway to implement the access system adopted by the NRAA. Participant A9 mentioned that the organization is developing legal regulations to facilitate the creation of a guide for managing digital content. Finally, participant A10 confirmed that their organization has a strategy for the future of digital preservation.

3. Digital preservation specialists

The responses to the question about designation of those responsible for digital preservation indicate that different organizations have varying approaches to this aspect. In some organizations, there is a designated person or department that oversees digital preservation, while in others, the responsibility is distributed among different departments or employees.

Institutions like A1, A2, A6, and A10 have designated individuals or departments responsible for digital preservation. A1, for example, mentioned that the organization has a director for the digital preservation Centre, and the IT officials are responsible for the electronic system. Similarly, A2 has a digital department that manages data preservation. Organization A6 has specialists in document management, and A10 has specialists in electronic preservation.

On the other hand, organizations such as A3, A4, and A8 do not have dedicated individuals responsible for digital preservation. In these cases, this task is distributed among different departments or employees. For instance, in A3, most employees of the IT department are responsible for digital preservation, while in 8a, all electronic systems are the responsibility of the IT department.

Overall, it is important for institutions to have dedicated individuals or departments responsible for digital preservation. Having such individuals or departments would ensure that the preservation process is given due attention and that the process is carried out efficiently and effectively.

Adoption of new technologies

From the interviews, it is evident that not all the organizations use cloud computing. Some of the organizations save their data on company servers, which means they do not use cloud computing (A1 and A4). In contrast, other organizations use cloud computing and have specified guarantees for the same within their service provision agreement (A3 and A8). In the case of organizations such as in A5 and A9 organizations, it is not clear if they use cloud computing or not.

Regarding the use of modern technologies related to big data and blockchain, most participants expressed some interest in adopting them. For instance, A2, A3, A6, and A8 expressed an interest in adopting modern technologies related to big data. However, some participants, such as A1 and A5, expressed no interest in adopting these modern technologies.

It is also essential to note that some participants, such as A4 and A6, do not clearly understand whether they use cloud computing. Those participants also do not clearly understand modern technologies related to big data and blockchain.

In conclusion, the use of cloud computing and adopting modern technologies related to big data and blockchain vary among organizations. Additionally, some organizations lack a clear understanding of whether they use cloud computing or not, and they also lack a clear understanding of modern technologies related to big data and blockchain. However, most organizations expressed a level of interest in adopting these modern technologies.

Data Protection and Rights

Based on the interviews, it appears that the participants hold varying opinions and knowledge regarding data protection and the right to be forgotten in the Sultanate of Oman. The data reveals that a Personal Data Protection Law exists in the Sultanate, which mandates entities to comply with its regulations (A1). However, some participants are unaware of the law or have insufficient knowledge about it (A4, A7). Others rely on the directives and policies issued by the competent authorities (A3), while some participants believe that a guide or similar regulation is unnecessary (A5, A9, A10).

One participant stresses the need for laws restricting loopholes in accessing personal data in the country (A6). Another participant points to the Royal Decree that pertains to the establishment of the NRAA, which specifies which documents can be viewed and when they can be viewed (A8). As for the existence of a strategy for the right to be forgotten, the interviews indicate that no such strategy exists in the Sultanate (A1, A2, A3, A5, A6, A7, A8, A9, A10). However, some participants noted that employee files might contain sensitive information subject to specific retention periods (A1, A8).

6. Discussion

It emerges from the results of our study that digital preservation is of interest to all the interviewees, especially who work in archives departments in public institutions. The majority are aware of the importance of this preservation and put forward at least three main reasons: first, the obligation to preserve all the administrative information stipulated by the Omani law on archives, and as all the institutions where our interviewees' work are public institutions and are directly affected by this law. Then, the participants consider that digital preservation guarantees the organization and security of documents, particularly by respecting the preservation and classification guides established by the NRAA. The third reason is the ease of finding and sharing documents: availability, immediacy and simultaneous access. All these reasons are consistent with what was presented in the study by (Aboraya et al., 2021) on the long-term accessibility and usability of digital content.

However, despite the importance given by archival specialists to digital preservation, the latter does not yet have a unified application strategy for all institutions. The results of our study show that storage is done both in internal servers and in private companies specializing in electronic archiving and by using cloud computing applications (including Microsoft). This prompted the NRAA to develop the "Wossoul" system with national cloud computing located inside the country, which all public institutions bet on to solve these problems of secure storage. This shows the awareness at the level of high authorities of the importance of digital preservation in an approach to the digital governance of institutions and the state.

Moreover, as this approach is only in its infancy, our questions on the tools, strategies and standards used in digital preservation have brought mixed results. Interviewees noted their optimism towards "Wossoul" system as a unified system with well-thought-out features and built-in standards related to metadata, encryption, file structure and format, and data security. These different standards are already mentioned in the various guides and recommendations of the NRAA and the Ministry of Transport, Communications and Information Technology.

The interviews shed light on the challenges Omani organizations face when attempting to preserve their digital documents, including technological obsolescence, security risks, big data management, high storage requirements, institutional and organizational challenges, and human resource challenges. Similar challenges were highlighted in the literature in many countries, including training and security risks (Kay Rinehart et al., 2014; Kirchhoff, 2008).

One of the main challenges identified is technological obsolescence, which leads to the rapid out datedness of electronic systems and information resources. This can make it challenging to use and fully leverage the potential of these resources, requiring organizations to keep up with modern changes, programs, and technologies to overcome this challenge. In addition, digital preservation depends on the system's developer, making renewing contracts critical in ensuring its maintenance over time (Conway, 2010).

Another significant challenge is security, as there is a risk of hacking, stealing, or erasing data, necessitating adherence to current security policies issued by relevant security authorities. This requires institutions to have recent policies to secure electronic documents and information issued by the security authorities, such as the National Authority for cyber defense.

Institutional and organizational challenges were also identified, including the lack of policies and guidelines to support the integration of documentation specialists with those in charge of digital preservation and a shortage of specialized expertise in managing digital preservation. Financial documents cannot be managed in digital form, which can lead to difficulties in understanding the document's context for staff. The complexity of document management systems and the changing file formats and sizes also present further challenges, necessitating regular hardware updates.

Human resource challenges, such as job instability of human cadres in information technology and the failure to manage systems and explain their details to specialists in the field of documents, were also identified through the interviews. Overcoming these multifaceted challenges will require careful consideration of technical, security, institutional, and human factors.

Despite these challenges, studies revealed many benefits, such as the storage of documents, ease of management, and providing powerful search options (Baro, 2016; Mannheimer & Cote, 2017). Similarly, our interviews shed light on the potential benefits of digital preservation, such as improved administrative memory, streamlined document sharing, and the ability to collaborate on the same file. Digital preservation was deemed essential for linking administrative institutions, facilitating services provision, and developing electronic and smart governments. The presence of digital data and documents enables the acquisition of reliable decisions and reports and facilitates monitoring and following up on government projects.

The literature reveals that emerging AI, blockchain, open data and internet of things technologies are considered among the top future directions of digital preservation (Adu et al., 2016; Hassan et al., 2019; Mannheimer & Cote, 2017). Future directions for digital preservation in Oman included developing specific plans and strategies for digital preservation, adopting modern systems for managing documents and electronic documents that are compatible with the standards of the NRAA, and using integrated systems for handling digital files. Organizations also need to develop special strategies to keep up with technological developments, and legal regulations must be developed to facilitate the creation of a guide for digital preservation.

7. Conclusion

The importance of digital preservation is not to be demonstrated; it is imposed today in all the institutions subject to our study, it is present and constitutes one of the most urgent concerns of the various archival specialists. Nevertheless, reflection at the national level must be done to put in place a national strategy for preservation and digital archiving in its broadest sense affecting both sectors: public and private. Our study shows that this work of

strategic reflection and development of standards is already underway as part of the electronic government project. It remains to convince a certain timidity, on the one hand, to involve archivists with computer scientists in the various strategies and applications of digital preservation and, on the other hand, to take into consideration all the standards related to documents and which are in addition of those who deal with Records management, particularly those who are linked to the quality and security of both information and systems.

The challenges of digital preservation identified through interviews conducted in Oman include technological obsolescence, security risks, big data management, high storage requirements, and human resource challenges. These challenges call for careful consideration of technical, security, institutional, and human factors to ensure digital documents' effective and long-term preservation. On the other hand, the potential benefits of digital preservation include improved administrative memory, streamlined document sharing, easy and quick access to documents and files, lower space storage costs, improved spending efficiency, and enhanced project management. The data from the interviews revealed that the presence of a strategy for digital preservation in the organizations varied among the participants, with some having a specific plan and strategy for digital preservation while others did not have a strategy in place. Overall, there is a need for institutions in Oman to develop and implement strategies for digital preservation to realize the potential benefits and overcome the challenges posed by digital preservation.

Finally, a good archiving strategy, in our opinion, ensures the integrity of documents and accessibility in the short, medium and long term and participates in particular in preserving personal data and the privacy of individuals.

8. REFERENCES

Abanumy, A., Al-Badi, A., & Mayhew, P. (2005). e-Government Website accessibility: in-depth evaluation of Saudi Arabia and Oman. The Electronic Journal of e-government, 3(3), 99-106.

Aboraya, W., Shemy, N., Said, S., Alkalbani, M., Shehata, N., & Abdelhady, B. (2021). Investigating the necessity of having digital repositories in postbasic education in Oman. International Journal of Internet Education, 20(2), 13-24.

Abubaker, H., Salah, K., Al-Muhairi, H., & Bentiba, A. (2015). Digital Arabic content: challenges and opportunities. 2015 International Conference on Information and Communication Technology Research (ICTRC),

Adu, K. K., Dube, L., & Adjei, E. (2016). Digital preservation: the conduit through which open data, electronic government and the right to information are implemented. Library Hi Tech.

Al Hinai, A. S. (2016). Archives and its Role in Preserving the Nation Memory: Legal and Scientific Use of the Records and the Role of National Records and Archives Authority in Oman as a Model. Atlanti, 26(2), 197-208.

Al Mughairi, M. M. ARCHIVES AND THE DIGITAL AGE. International Institute for Archival Science of Trieste and Maribor, 38.

Al Sulaimani, A. H. A., & Ozuem, W. (2022). Understanding the role of transparency, participation, and collaboration for achieving open digital government goals in Oman. Transforming Government: People, Process and Policy(ahead-of-print).

Awamleh, M. A., & Hamad, F. (2022). Digital preservation of information sources at academic libraries in Jordan: an employee's perspective. Library Management.

Baro, E. E. (2016). Digital preservation practices in university libraries: A survey of institutional repositories in Nigeria. Preservation, Digital Technology & Culture, 45(3), 134-144.

Becker, C., Kulovits, H., Guttenbrunner, M., Strodl, S., Rauber, A., & Hofman, H. (2009). Systematic planning for digital preservation: evaluating potential strategies and building preservation plans. International journal on digital libraries, 10(4), 133-157.

Conway, P. (2010). Preservation in the age of Google: Digitization, digital preservation, and dilemmas. The Library Quarterly, 80(1), 61-79.

Elnaggar, A. (2008). Towards gender equal access to ICT. Information Technology for Development, 14(4), 280-293.

Galyani Moghaddam, G. (2010). Preserving digital resources: issues and concerns from a view of librarians. Collection Building, 29(2), 65-69. https://doi.org/10.1108/01604951011040152

Gaur, R. C., & Tripathi, M. (2012). Digital Preservation of Electronic Resources. DESIDOC Journal of Library & Information Technology, 32(4).

Hadidi, M. S., & Al Khateeb, J. M. (2015). Special education in Arab countries: Current challenges. International Journal of Disability, Development and Education, 62(5), 518-530.

Hassan, M. U., Rehmani, M. H., & Chen, J. (2019). Privacy preservation in blockchain based IoT systems: Integration issues, prospects, challenges, and future research directions. Future Generation Computer Systems, 97, 512-529.

Jaeger, P. T., & Xie, B. (2009). Developing online community accessibility guidelines for persons with disabilities and older adults. Journal of Disability Policy Studies, 20(1), 55-63.

Kay Rinehart, A., Prud'homme, P.-A., & Reid Huot, A. (2014). Overwhelmed to action: digital preservation challenges at the under-resourced institution. OCLC Systems & Services, 30(1), 28-42.

Kirchhoff, A. J. (2008). Digital preservation: challenges and implementation. Learned Publishing, 21(4), 285-294.

Kulkarni, M. (2019). Digital accessibility: Challenges and opportunities. IIMB Management Review, 31(1), 91-98.

Lazar, J., Goldstein, D., & Taylor, A. (2015). Ensuring digital accessibility through process and policy. Morgan kaufmann.

Lee, K.-H., Slattery, O., Lu, R., Tang, X., & McCrary, V. (2002). The state of the art and practice in digital preservation. Journal of research of the National institute of standards and technology, 107(1), 93.

Lewthwaite, S., & James, A. (2020). Accessible at last?: what do new European digital accessibility laws mean for disabled people in the UK? Disability & Society, 35(8), 1360-1365.

Lucchi, N. (2013). The Role of Internet Access in Enabling Individual's Rights and Freedoms. European University Institute-RSCAS Working Paper(2013/47).

Mannheimer, S., & Cote, C. (2017). Cultivate, assess, advocate, implement, and sustain: A five-point plan for successful digital preservation collaborations. Digital Library Perspectives.

Masenya, T. M., & Ngulube, P. (2020). Factors that influence digital preservation sustainability in academic libraries in South Africa. South African Journal of Libraries and Information Science, 86(1), 52-63.

Mehta, S. R., & Hemmy, K. (2021). Digital Humanities in Oman: Logistics, Challenges and Opportunities. Knowledge Cultures, 9(1), 56-74.

Mkadmi, A. (2021). Archives in the Digital Age: Preservation and the Right to be Forgotten. John Wiley & Sons.

Oliveira, A. C., da Silva, L. F., Eler, M. M., & Freire, A. P. (2020). Do Brazilian Federal Agencies Specify Accessibility Requirements for the Development of their Mobile Apps? XVI Brazilian Symposium on Information Systems,

Valtolina, S., & Fratus, D. (2022). Local Government Websites Accessibility: Evaluation and Finding from Italy. Digital Government: Research and Practice, 3(3), 1-16.