The Strategic Programme for the Management of Digital Preservation of Governmental Records

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Abstract:

The NLAI, as the national organization in charge of preserving the legacy of national and governmental records in Iran, has taken noteworthy steps in digital preservation. The results of the survey show that the NLAI's priority has been given to the digitization of national and governmental resources which are of historical and national importance. There have been some attempts to implement the following: development of hardware and software infrastructure , determination of priorities for the production of content in digital programmes, examination of standards in the area of digital resource preservation, national cooperation for the implementation of digital programme including the cooperation with national content consortium, use of security systems to develop a safe repository, application of national and international standards and protocols, compilation of the policy of access to digital resources, determination of policies for digital programme and raising funds.

Keywords: Governmental Records, Digital Preservation, OAIS, Strategic Programmes, NLAI

1. Introduction

Given the huge bulk of information om the web and the ephemeral nature of web-pages, many national archives encounter difficulty in managing the preservation of digital information and making it accessible to the posterity (Gatenby, 2005,p.60-6). To manage the preservation of their

digital records, these archives have launched digital archiving and have benefited from the Online Archival Information System (OAIS) Reference Model in order to develop and design the digital archives in question. There are many models and paradigms for the management of digital records. However, to achieve the purpose of permanent access to records, certain processes should be carried out including 1) selection and acquisition of records to preserve their value permanently in a safe place generally known as digital archive; 2) organization of acquired records to expedite management and access to them; 3) application of digital preservation programme so as to thwart the threats arising from the change of software and technologies upon which these resources depend.

The technologies of digital information storage are rapidly developing and new formats are entering the market as old and outdated media disappear and the information based on obsolete technologies becomes inaccessible. Therefore it is necessary for the archives to adopt policies and strategies as to deal with this issue, so that they can preserve all digital records perpetually on standard media and make them accessible. The development of policies and digital records` preservation programmes for many archives is a real challenge as Gatenby (2004, p.362) remarks in his article:

> *Preservation considerations and strategies have been integral from the outset to the Library's development of digital collections. The objective of collecting web resources that are archived in PANDORA is to manage them over time in order to provide on-going public access to them. This requires both immediate and long-term planning and active day-to-day management of the archived resources* (Gatenby, 2004, p.362).

In other countries, some research into this issue have been carried out by archives and international organizations, but in Iran not much has been done except for Samiee`s PhD dissertation (2010) entitled "A survey of preservation of digital resources in the national libraries with the membership of the International Internet Preservation Consortium (IIPC) and proposing a preservation plan for the National Library & Archive of Iran". In most of the works available in the other countries, standards, strategies and challenges of archivists have been surveyed, amongst which one can make mention of Grace`s dissertation entitled "Adapting preservation policy in archives to the digital age." He has presented an overview of digital technology and preservation policies in association with collections of cultural heritage and a survey of digital preservation policies in the selected national archives and one national library. The findings of this research signify the predominance of technology as a deterrent factor in policy-making over digital preservation.

Lee (2005) in his PhD dissertation entitled "Defining digital preservation work: a case study of the development of the reference model for an Open Archival Information System (OAIS)" presents methods of developing a preservation standard, entitled the OAIS reference model, and describes the entities of this standard for its development and maintenance for long-termed access of users and comprehension of the information in archives. Nordland (2007) in his PhD dissertation entitled "The International Development Research Center as a case study for long-termed digital preservation strategy" deals with the challenges of archivists and records` managers in the realm of management of long-termed preservation of digital records. Duranti (2007) in his article entitled "An overview of InterPARES3(2007-2012) attempts to identify the elements of electronic records which should be preserved and also to devise some criteria for the evaluation of the preservation method of digital records and not to mention some principles for the development of national and international strategies for the long-termed preservation of electronic records.

In a report of The U.S. National Archives and Records Administration (NARA, 2008) the following issues have been looked into in accordance with the OAIS reference model: development of a persistent archive for ingest, archival storage, discovery, and preservation of digital collections based on preservation programme. The other research projects carried out pertaining to digital preservation include the National Digital Information Infrastructure and Preservation Program's (NDIIPP) Library of Congress (2010),"the handbook strategy of digital preservation, British Library"(2010), "Policy of digital preservation, National Library of Australia" (2008); and finally

"Digital initiatives at the library and archive of Canada"(2010). Due to the structural resemblance existing between the National Library and Archive of Canada and the NLAI, the former has been determined for this case study.

In this paper we intend to assess the status of digital preservation of governmental records at the NLAI compared with those in the National Library and Archive of Canada and based on the two following questions whose answers we will try to provide.

1-What is the current status of digital preservation at the NLAI?

2-Which strategies are proposed for the long- termed preservation of digital national heritage at the NLAI?

2. The Status of National Governmental Records

Governmental records as common international monuments contribute considerably to the maintenance of religious, national and cultural identity of the past present and future. It should not be forgotten that these monuments are vulnerable. Many of unique and valuable records and even whole archival collections in the course of history have deteriorated due to natural hazards and disasters and especially wars or, they may have got torn up or worn out through the negligence of government or their owners. A notable part of records` heritage on a worldwide, regional, national and provincial scale have perished as a result of paper acidity, parchment formats, vellum, overexposed films and magnetic tapes, heat, moisture and dust. In addition to natural factors, human events and incidents may also damage the archives. We can protect our records against these events only if we take preventive measures. One of these preventive actions in the modern age of information is digital preservation. According to the definition of digital preservation coalition

Digital preservation refers to the series of managed activities necessary to ensure continued access to digital materials for as long as necessary. Digital preservation is defined very broadly for the purposes of this study and refers to all of the actions required to maintain access to digital materials beyond the limits of media failure or technological change. Those materials may be records created during the day-to-day business of an organization; "born-digital" materials created for a specific purpose (e.g. teaching resources); or the products of digitization projects.

Digital preservation involves two fundamental processes, namely archiving and accessing the content of resources in the long run. Now we must establish which factors are likely to threaten the accessibility of the digital object in the future. Dependence on technology in digital resources which results in their obsolescence and short life-span, is today one of the gravest challenges as regards preservation (Reed, B. 2006, p.119). One of the other challenges disrupting access to digital object is the threat of software problems, network faults, user errors, ease of manipulation, internal and external invasions, (Gladney, H.M. 2007, p.10) software limitations, limitations on file formats, software obsolescence, and the need for a constant cycle of management and a constant budget for digital preservation, (Gladney.2007, p.10). Organizational and legal challenges are some of the other problems arising in digital preservation.

Iran's National Archive is the government's memory and protector of national identity and the records existing therein help the government make right decisions based on historical evidence and precedence .Broadly speaking some of the goals and tasks at the National Archive of Iran (NLAI) include:

- Collection and preservation of national records (governmental and non-governmental) and providing proper facilities and conditions for public access to these records;

- Determination of a suitable policy to deal with disused records of the government and its affiliates and identification of the valuable and useful records;
- Scrutiny over the execution of laws and proposals ratified by the council of national records at governmental organizations and affiliations;
- Scrutiny over the transfer of records worthy of preservation to the organization
- Preservation and maintenance ,restoration , arrangement , and processing of archival records collected by real and legal institutes

In order to preserve and maintain the national and governmental records, since 2006 the NLAI has included within the new organizational chart the department of records` preservation and maintenance consisting of four divisions:

1) Pathology and laboratory;
2) Pathology and restoration of records;
3) Microfilms and digital records;
4) Preservation of audio-video resources.

Given the threatening factors in digital preservation, some challenges arise; for instance who takes charge of preserving the digitized governmental records, and how can digital governmental records be preserved among the media used for recording information in view of their short life-span, and which strategies exist to maintain the accessibility of digital governmental records? It has been some time now since these challenges in the archives of different countries have turned to serious concerns of digital preservation. The National Archive of Iran that is officially responsible for the preservation of national heritage, has taken effective measures to deal with the challenges in question.

One of the researches carried out on digital preservation abroad is "Reference Model for an Open Archival Information System (OAIS)" which is a reference model for digital preservation by the Consultative Committee for Space Data Systems (CCSDS)(2002). The explosion of information in digital media has brought some challenges about. In this paper we have attempted to propose strategies for the long-termed preservation within the framework of the OAIS as a reference model for preservation and long-term digital access in the persistent repository.

3.Methodology

In this research, while looking into the state of digital preservation at the NLAI based on a survey using a checklist designed by the researcher, the digital preservation at the library and archives of Canada has also been examined using the library method and because of the common library and archival structure. By drawing on the components and requirements discovered for digital preservation and adapting to the needs of the NLAI, a checklist has been compiled. The components in question include: digital object, digital repository, the management structure of a digital repository, compliance with the OAIS, compliance with the DELOS Reference Model, preservation tools, ingestion and storage, metadata and metadata projects, standards, access, acquisitions, preservation strategies, preservation policies, organizational structures, labour, and budget and national approaches. The checklist was drawn using the above-mentioned components in a series of 18 questions.

4. Findings

In response to the first question, a survey of the current status of digital preservation in the National Archive of Iran shows that long-termed preservation of the content of governmental records at the NLAI as part of the digital programme is developing. This development involves both the completion of digital object collections and also that of software.
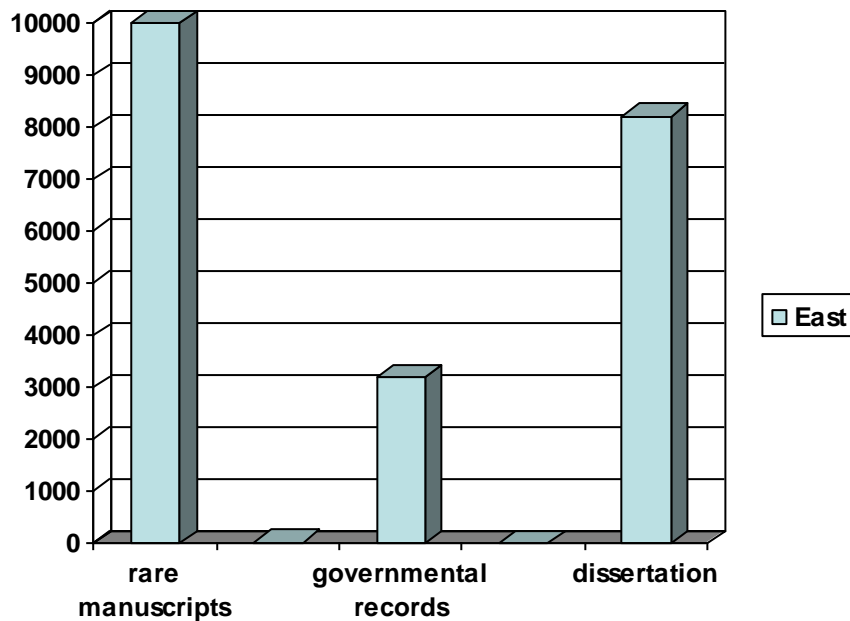
Diagram 1.Rate of Digitized Resources at the NLAI

Although the software system is not yet fully developed and is still being promoted frequently, it enjoys such outstanding features as compliance with the format of standard file and standards, cost-efficiency, maintenance of specifications, capacity for software development, promotion, support and policy-making. The budget allocated to digital programme at the NLAI covers software costs, establishment of collections, hardware and labour.

The use of a consolidated digital repository for the storage of digital objects and observation of security procedures assures the physical protection of the organization. The adoption of danger-management strategies and the development of programmes and models to eliminate factors likely to threaten the repository, are part of plans designed to maintain the safety of the repository and which can be found on the agenda of the NLAI`s preservation programmes.

The employment of the OAIS which was introduced by Samiee (2010) as the only preservation standard is one of the salient specialized initiatives carried out in digital preservation, and the NLAI is benefiting from it to progress its digital programmes. The OAIS, based on three environmental, informational and functional models and their entities, bring up the requirements of digital preservation. Samiee (2010) approved this standard`s application in all national libraries in her PhD dissertation (v.sup) and also in her article (2012) "Digital preservation in the National Archives of the world; Strategies and standards". One of the other standards in use is Metadata Encoding and Transmission Standard (METS) whose employment at the NLAI along with the promotion of its version, rank as remarkable initiatives carried out by this organization.

Table 1. Standards Associated with Digital Preservation in Iran and Canada

	CANADA	IRAN
OAIS	✓	✓
METS	✓	✓
DELOS	–	Under investigation

One of the other initiatives adopted by the NLAI to vouch for long-termed preservation is the use of metadata. Metadata is a tool for the management of information resources whether in analogue or digital form, and with a variety of functions. One of its functions is the important role it plays in terms of preservation: Deegan & Tanner consider metadata an inseparable component incorporated into the information system, which is applied to assure the preservation of digital object. To realize preservation, all types of metadata are assumed as required information. Dublin Core, EAD (Encoded Archival Description), PREMIS (Preservation Metadata Implementation Strategies), ISAD (International Standard Archival Description (General), MOREQ (Model Requirements for the Management of Electronic Records) are metadata projects used by the National Library and Archive of Canada. Dublin Core is descriptive metadata; that is to say, it is used to describe digital objects. This metadata is diametrically implemented by the NLAI.

Table 2. Common Metadata(s) between the National Library and Archive of Iran & Canada

	CANADA	IRAN
Dublin Core	✓	✓
EAD	✓	being studied
PREMIS	✓	being studied
ISAD	✓	✓
MOREQ	✓	being studied

In Table 3 the preservation strategies applied in Iran and Canada are compared. The digital preservation strategy refers to methods for maintaining permanent access to stored resources. In fact, the preservation strategy is an attempt to grapple with technical challenges and the factors threatening digital object (PADI, 2010, Verheul, 2006, p.20). Providing back-ups, refreshment, migration, emulation, making copies on analogue media, encapsulation, and compliance with standards are all strategies studied in digital preservation. Of the above-mentioned strategies, safe storage along with back-ups, refreshment and file format normalization rank as the most common and prevalent strategies ever applied. Bit-stream is a preliminary strategy employed by the Library & Archive of Canada (digital initiatives of the Library & Archive of Canada, 2010). The NLAI complies with standard file formats and normalization to support the digital object. The application of standard formats is one of the best methods of using technology, with a view to assuring access to digital objects in the long run (King, 2010).

Table 3. Survey of Preservation Strategies in the National Library & Archive of Iran and Canada

Preservation strategy	CANADA	IRAN
Preservation of technology	✓	✓
Emulation of technology	-	-
information migration	✓	✓
Encapsulation	✓	-
Providing back-ups	✓	✓
Archaeology of data	✓	-
Application of identifiers	✓	-

According to the findings of this research, the NLAI has drawn on the following for the digital preservation of its governmental records: the OAIS, METS & Dublin Core, strategies for the management of dangers and risks to secure the repository, a software system with the capacity for development and support, compliance with the standards of software system, and finally emphasizing safe storage along with back-ups and normalization. In response to the second question through a survey of the strategy adopted by the National Library and Archives of Canada, we can identify the appropriate methods of preserving the digital national heritage at the NLAI. There are four areas where the strategies for the preservation of digital national heritage come to the fore: adoption of preservation strategies, use of metadata and metadata projects, compliance with the OAIS, and development of a reliable digital repository. These strategies are acknowledged as appropriate courses of action in all over the world and are not only complied with in many different countries, but also some international organizations are making efforts for their implementation. Below the application of these strategies at the NLAI is surveyed.

Preservation strategies: two points are of great account when it comes to determining the priorities for the application of preservation strategies: the nature of the digital object and the reason to preserve it. That is to say that the selection of a particular preservation strategy calls for accurate and specialized investigations (Day.2006, p.184).

In the process of the analysis of findings, the application of preservation strategies in the library and archives can be classified as: physical preservation activities and normalization, logical preservation activities, and activities for the future. Physical preservation activities including safe storage by means of back-ups and normalization (i.e. converting the file format into an acceptable file format) are favoured by the National Library and Archives of Canada as preservation strategies. Activities of logical preservation (i.e. preservation of applied programmes, operating systems and the hardware environment assure the implementation of an application) including migration and emulation, which call for the development of required tools, have been favoured by many libraries and national archives in recent years. The European Commission's *Planets, Preservation and Long-term Access through Networked Services* were founded to develop the required tools and guidelines. Of the goals pursued by this commission, one can make mention of methodology and the

development of tools and services to describe the attributes and peculiarities of digital object and development of innovative solutions for long-term preservation strategies. Some of this commission`s other activities include the development of emulations, the concepts of hardware emulation & UVC, and the evaluation and comparison of preservation strategies. Long-term preservation strategies in future archives and libraries will depend on the financial capacity and policy of libraries and archives. But in view of the technological changes, there is an uncertainty about long-termed preservation which worries those involved in digital preservation. At the NLAI, interaction with universities and technology corporations in Iran and abroad to find appropriate tools and technologies for such strategies as emulation, migration and the others can help the adoption of appropriate strategies for digital preservation.

Metadata and metadata projects: the success of a preservation strategy hinges on the extraction, development, maintenance and use of a suitable metadata. The applications of PREMIS in digital`preservation have been mentioned in the OCLC & RLG`s report. The PREMIS data model sees to the long-term preservation of digital objects by developing a framework for preservation metadata. Therefore the use of PREMIS to assure long-term access to digital object seems necessary. Samiee (2010) confirms that90% of libraries with the membership of IIPC use PREMIS. The NLAI has not yet made any special efforts as to localize PREMIS, even though it is on the agenda for future plans.

The National Library and Archives of Canada accentuate the implementation of PREMIS metadata for its long-term preservation. The primary application of PREMIS is for the design of the repository, the repository`s assessment, and the exchange of archival informational packages among preservation repositories. The handbook and data dictionary of PREMIS (OCLC & RLG, 2008) is a comprehensive reference for launching preservation data in digital systems. This handbook comprises a collection of fundamental standardized data elements recommended for the management and administration of present practices in digital repositories. One of the administrative initiatives of PREMIS has been the development of PREMIS-in-METS toolkit. This is one of the initiatives carried out by the Library of Congress for the development of required tools, so that they could launch preservation metadata within METS content (Guenther, 2010). In Iran the concepts and components of PREMIS model are being localized with the aid of OCLC and RLG handbook (2008) and the experiences of other countries and are also being applied for long-termed preservation.

OAIS: OAIS is a preservation standard followed in many repositories. The NLAI too is concentrating on the correspondence between the OAIS and the practice of a digital repository. Samiee (2010) in her PhD dissertation proposes that the NLAI adopt the OAIS and archival information standards, but the proposal is still being studied and hitherto only partially implemented.

Trusted digital repository: a digital repository is a place for storage, access and preservation of digital objects (Jatz, R, & Giarlo, M.J.). A trusted digital repository sees to the long-termed preservation of the content of digital objects. The model of a trusted digital repository represents the qualities of a persistent digital repository on a huge scale and for heterogeneous organizational collections. This model raises organizational concepts for digital preservation (OCLC & RLG, 2002). Nordland (2007) finds the model of a trusted digital repository quite necessary for long-termed preservation. OCLC and RLG (2002) have represented the model of a trusted digital repository as the structural map of organizational content and a structural model for a digital repository. The tasks of a trusted digital repository include: identification of administrative and curatorial responsibilities, announcement of agendas, requirements, requisite tools, interaction models, and design of an archival system, declaration of legal aspects and preservation strategies, and finally compliance with the OAIS.

Thus the major step in digital preservation and long-termed access to digital object is the design of a preservation map with the help of a trusted digital repository. On the other hand, compliance with the OAIS in this model leads to the development of a digital repository with reliability for long-termed preservation of digital objects. The Library and Archives of Canada emphasizes the trusted digital repository in particular and accordingly has adopted the compliance with this model and control and appraisal for its long-termed preservation (digital initiatives of the Library and Archives of Canada, 2010). The first step to design a paradigm for a trusted digital repository at the NLAI is to design the OAIS model befitting the NLAI`s specifications as proposed by Samiee (2010). The other requirements for the design of a repository model may include: determination of the status of the staff or labour, determination of the status of security system requirements, deciding on how the system should be monitored, determination of its status, and determination of the status of interactions in the model.

5. Conclusion

The NLAI as a national organization officially responsible for the preservation of Iran`s digital national heritage, has taken striking steps in digital preservation. According to the findings of surveys, the priority of the NLAI has specifically been the digitization of governmental and national resources which are of historical and national significance, including Iran`s governmental records. Attempts have been made to implement the following initiatives: development of software and hardware infrastructure, determination of priorities to develop content in the digital programme, surveys of the standards in the preservation of digital resources, national co-operations for the implementation of the digital programme, applications of a security system to develop a safe repository, use of national and international protocols and standards, compilation of the policy of access to digital records, development of policies for digital programmes, and supply of funds and financial sources.

Lately the NLAI has taken big strides towards digital preservation and its approach has been based on the development of resource content and infrastructural grounds for the digital programme and yet the importance of digital object and its challenges as well as the ever-increasing extension of these resources necessitates the expedition of this process at the NLAI. Some of the noteworthy issues regarding the digital preservation at the NLAI include: increase of national and international co-operations, development of tools and localization of standards, increase of the budget in proportion to the requirements of the digital programmes, and survey of appropriate preservation strategies for future progress. Eventually it must be admitted that despite the NLAI`s attempts for the long-termed preservation of the content of digital resources, there are still many problems and challenges deserving full attention and devotion such as confirmation of deposit law, legal challenges, localization of PREMIS metadata, logical preservation, and development of requisite infrastructures, e.g. automation infrastructures.

At the end, the following suggestions are presented to improve the current status of digital preservation and to promote it:

- design of an appropriate software for the digital archive at the NLAI,
- implementation of METS and OAIS standards in the software system of the NLAI,
- application of a preservation strategy and appropriate tools for the storage of digital records and its implementation at the NLAI,
- employment and localization of proper descriptive and preservative metadata (AAD & PREMIS) for digital records in the software system of Iran`s National Archive,
- compilation of a comprehensive strategic programme for the digital preservation of national governmental records,
- obligation of governmental organizations to transfer non-current records to the NLAI,

- formation, implementation and expansion of a comprehensive undertaking for the records in all executive organizations in order to organize and maintain the national governmental records for the posterity in the administrative memory of the country.

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