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### **An exploration of strategies and recent developments in digital preservation: outline of an international inquiry by the *Koninklijke Bibliotheek***

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#### ***Abstract***

*This paper describes the international inquiry the National Library of the Netherlands (Koninklijke Bibliotheek or KB) will perform for ICABS. The inquiry will address the requirements/conditions for long-term archiving of electronic resources and explore strategies, methods and standards for migration and emulation. The focus for both subjects will lie with issues that are most relevant for the library community. Based on desk-research, interviews and analysis of new developments a report will be written containing best practices, evaluation of emerging standards and recommendations for future research and development. After years of discussing the problem and possible solutions, the last few years have seen an increase in actions that are taken to set up digital archives, organize the management of digital resources and define strategies for permanent access. This means now is a good time to take inventory and define best practices, evaluate emerging standards and describe issues that need extra attention.*

#### **Introduction**

In the mission statement of the ICABS strategic plan, it says the ICABS alliance aims "to advance understanding of issues related to long-term archiving of electronic resources, including the promotion of new and recommended conventions for such archiving." The focus of the alliance is strategic, with emphasis on offering practical ways to improve international

coordination and to steer developments. The National Library of the Netherlands (Koninklijke Bibliotheek or KB) has committed itself to the actions:

- Explore the requirements/conditions for long-term archiving of electronic resources.
- Explore and promote strategies, methods and standards for migration and emulation.

These actions will be performed through desk-research, interviews and analysis of new developments and will result in a report containing best practices, evaluation of emerging standards and recommendations for future research and development. Preliminary findings and a draft of the results will be discussed with the National Library of Australia and the other ICABS partners. In ICABS, the NLA is addressing two closely related subjects. First, they will explore and promote methods to archive web-based publications collected by web-harvesting. They will also address guidelines and standards in the preservation of digital materials focussing on the role of the PADI subject gateway and on developments in South East Asia. The NLA and KB will keep in close contact and share results.

At the moment of writing this paper, this international inquiry is at its early stages. The outline of the study has been made and research has just begun. Therefore I will focus on the issues at hand and the rationale behind the set-up of this inquiry.

### **Two areas: digital archiving and permanent access**

Digital preservation consists of two steps: safe storage and permanent access. To ensure safe keeping of digital objects, a digital archive dedicated to long-term maintenance is needed. Such an archive preserves the bit-stream and its format and metadata is registered to ensure description and retrieval. Careful procedures should be designed and carried out for back-up and refreshment of hardware and carriers. The future rendering of the stored digital items is another issue. How can we be sure we can view and execute digital objects in ten, fifty or even a hundred years from now? Strategies such as migration, conversion, normalization and emulation should be considered and developed. But we also need tools that ensure this permanent access.

During the last couple of years the problem of digital preservation is recognized and taken up by cultural heritage institutions and governments. After years of discussing the problem and possible solutions, actions are taken to set up digital archives, organize the management of digital resources and define strategies for permanent access. Co-operation, knowledge-sharing and standardization have been endorsed by several groundbreaking international projects.

After initial theoretical research resulting in tests, pilots and prototypes, development of digital archives has begun and several systems dedicated to the long-term storage of digital resources are operational now. While the development of 'safe places' to store electronic resources is well on its way, R&D into permanent access technology is only just beginning. Tools and methods for permanent access require intensive technological research, and practical testing in the digital archiving community.

Extensive tests are conducted on ways to retrieve obsolete file formats and define procedures to prevent future problems, but it is the practical development of tools that is still very scarce. The technological challenge is major, and as of yet, commercial software developers have been reluctant to take up the work that may not raise immediate profits.

Both issues, digital archiving and the continuous rendering problem, have now reached a stage that allows us to take inventory. What are the results of ongoing projects in this field,

what problems occur, how has standardization contributed to practical development and what areas need extra attention? An assessment can point out best practices and can address issues of concern. The KB's ICABS inquiry will in this respect focus on digital preservation in a library environment.

### **Publications, overviews and surveys**

Along with rising attention and developments, publications on digital preservation have seen a major increase. Information used to be scattered and hard to find, but this is not the case anymore. Magazines dedicated to digital libraries issues provide a platform for reports on ongoing tests and developments and analyses of research of technical or infrastructural problems. Dissertations and studies have been published discussing specific subjects in the area of digital preservation.

In 2002 and 2003 some major overviews of the 'state of the art' in digital preservation were published. Everyone familiar with this subject will for instance know the Unesco Guidelines by Colin Webb and the NDIIPP program including the study by Neil Beagrie.[1,2] International working groups like the NSF-DELOS Working Group on Digital Archiving and Preservation, the RLG Digital Archive Attributes Working Group, and the OCLC-RLG Preservation Metadata working group have discussed and published on specific subjects, giving an international view on major developments.[3,4,5] Other major publications are aimed at organisations and managers, providing guidelines and recommendations on how to manage their digital resources.

Direct insight in the work that is conducted world-wide, has become possible through several surveys that have been carried out and extensive and up-to-date knowledge centres maintain websites that give structured access to all sorts of publications and current projects, like PADI, Erpanet and DPC.

### **Recent developments**

As activity is growing, different approaches become clear. Differences in architecture of archiving systems, in practical handling of submissions, in formats used for storage and in strategies for permanent access. The OAIS reference model has been accepted worldwide and provides a well defined starting point for the design and structure of digital archives. While the design of many digital archives is informed by the OAIS reference model, the way the model is interpreted varies substantially. And there are institutions that have not designed their systems according to the OAIS: either because they started development before the final version of the OAIS was published, because they were not aware of the model, or because they chose another approach. Much depends on the mission, role and responsibility of the archiving institution, types of objects to be stored and the way services are organized.

Cultural heritage institutions, with libraries and archives in the lead, have been among the first to set up digital archives for the long-term maintenance of digital resources. Scientific and technical research institutions and especially space research organizations have also taken up the issue at an early stage. Comparing approaches now shows differences between these different kind of organizations. This enables us to go more into detail when analyzing the library-specific approaches and challenges: the focal point of the KB's ICABS study.

Concerning permanent access, two approaches are becoming clear. The first is to just store everything as save as possible and let future users worry about rendering. The other approach is to work out and test strategies and practical tools now. These approaches are off course extremes. Most archiving institutions take up a position somewhere in between. By carefully choosing the formats they are storing, preferring standardised and widely used formats, making detailed descriptions of the technical requirements of the stored objects, gathering information on the consequences of technological developments and storing originals together with converted copies, digital archives hope to provide access to future users.

### **The KB international inquiry**

The KB-ICABS study should not be yet another survey or overview, but should build on recent publications, information on ongoing projects and survey results. This means: summarizing the main conclusions of the studies, combining these with practical information on ongoing work in libraries and highlighting specific areas such as library strategies and standardization.

A selection will be made of the world's leading institutions in digital archiving and the people responsible will be contacted to answer specific questions. This way, ongoing developments and inside-stories of development projects can be documented. Specialists will be asked to define recommendations for libraries planning to build digital repositories.

### **Issues that will be addressed can be grouped into four categories:**

#### *1. Architecture of digital archives*

The development of digital archives has shown both differences and similarities in architecture. Different models will be compared, projects evaluated and experiences described. This will result in the definition of best practices.

#### *2. Preservation metadata and format registry*

Several new initiatives focus on the definition and creation of preservation metadata. Registering information will be crucial and international co-operation may lead to schemas that will facilitate the creation of preservation metadata. Initiatives to establish format registries that contain technical information on the maintenance and rendering of digital formats are of major importance. The inquiry will not discuss preservation metadata in detail but will address ongoing initiatives that are relevant to the architecture of digital repositories and the technical registration of format information that supports future rendering.

#### *3. Emerging standards*

International co-operation through working groups and certification initiatives have worked on the definition of models and standards. In what way have these efforts contributed to the development and architecture of digital archives? If nothing else, this co-operation has lead to a joint vocabulary which enables us to communicate world-wide and compare different approaches. Through interviews we hope to provide insight into the way standards and protocols are used in practice and what could be areas that would profit from new standardization efforts.

#### *4. Research and development of permanent access tools*

The development of tools and methods that support permanent access strategies is often carried out at technical research institutes, even if projects may be initiated by

libraries or other cultural heritage institutions. The development of tools sometimes requires intensive programming and detailed insight into applications and information technology. Up-to-date knowledge of the newest and upcoming technical innovations is needed. For libraries, it is important to work closely with the technical engineers to focus developments on long-term maintenance and especially permanent access issues; the information professionals' expertise. During the assessment of digital archiving activities, organizations that are also working on the issue of permanent access will be selected. A selective study into the experiences and expectations concerning rendering strategies will follow. Since this is a subject that involves specific technical knowledge that would surmount the scope of this study, the focus of the research actions on permanent access technology will be on practical use and possibilities for libraries.

The results of the inquiry will be presented in a report intended to serve as a document to help understand digital preservation strategies and support implementing policy. A draft version of the results of the inquiry will be sent to the ICABS partners. After a review-process it will be determined how this report will be made generally available.

## References

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