IFLA WLIC 2013
SINGAPORE

Submitted on: July 30, 2013

Preservation and Conservation as an integrated process in the German National Library: Status Quo and Outlook

Reinhard Altenhöner
German National Library, Frankfurt, Germany

Abstract:

Preservation and conservation have become an important working field for libraries. Based on the example of the German National Library, this paper discusses aspects of workflow organization and optimization.

In former decades, the conservation[1] task within the working profile of libraries was carried out in the book binding and repair section, which was often located close to the rare books / manuscripts department or special collections unit. Here object-related tasks such as book cleaning, status checks and documentation or even restoration measures were coordinated. At the German National Library complementary a deacification workflow was implemented in the Nineties, forming a new dedicated organizational unit. Even though the starting conditions are different, a similar development can be expected for digital preservation within the next few years: Organizational units will be created to govern the workflows on an operational level. An organizational unit will also be set up to digitize analogue material, thereby expanding the group of sectors in the field of conservation and preservation. These organizational units have their own dedicated processes, tools and working routines which often seem unconnected to each other. But in a broader perspective there are many areas of overlap where similar questions and process steps are tackled. It therefore seemed appropriate to merge some of the different units, a path which the German National Library decided to follow in 2010/2011. Since this time conservation/preservation has been regarded as a cross-departmental and cross-functional task based on integration and mutual transparency. Practically this can be effected if actions to capture the original material and "migration"-based conversion actions processed in the digital realm have to be addressed. This paper presents a detailed overview of organizational and pragmatic conclusions that have been drawn by the DNB.

[1] In this article the terms conservation and preservation have been used interchangeably.

1. Introduction

Preservation is one of the key tasks of libraries, especially of national libraries, including the German National Library (Deutsche Nationalbibliothek, DNB). Acting as the central archiving library and the national bibliographic information centre for Germany, the DNB is entrusted with the task of collecting, permanently archiving, fully documenting and bibliographically indexing all German and German-language publications from 1913 onwards and making them accessible to the general public. The amended law regarding the DNB, dated 22 June 2006, extended the Library's collection mandate to cover online publications[2]. It states that online publications – i.e. all written, image or sound-based representations made available digitally in public networks – should be collected, indexed and archived alongside works published in printed or micro form, on sound carriers or in any other physically disseminated electronic form. The law explicitly states that the objects have to be collected in their original publication form ("im Original"). The library's mandate is limited only in so far as it has to take into account the fact that the collection of the material has to be carried out in a way which is in the public interest and has to strike a balance between the amount of work involved and the expected result[3].

For the DNB, preservation includes two challenges: On the one hand the main focus of the library is the 20th and 21st century, which means that the publication rate is extremely high. On the other hand the variety of different physical carriers is wide and the persistence and technical quality of the physical materials used are often low. Possibly the best known problem is that of acid paper which affects the whole period of DNB collections. Although in international collaboration with publishers it was possible to significantly increase the proportion of acid-free paper, the proportion used in printed publications submitted to the DNB rose to a value of almost 80 % in the period between 1999 and 2009. This figure has, however, decreased significantly in recent years again. In addition, the 20th century was characterised by experiments and the introduction of new media formats which cause widespread difficulties in ensuring persistent access. An enormous number of formats were introduced for the distribution of music and other items, for instance.

Additionally the DNB holds various special collections of rare books and manuscripts which encompass the whole history of printing, archival material such as the estates of novelists, an audio archive covering the history of recorded and distributed music, and a collection of maps. The DNB's tasks therefore incorporate the whole range of materials usually stored in institutions in the cultural heritage domain and preservation issues have to be addressed at various levels.

As mentioned, the new law moves the activities of the DNB into the area of digital preservation. Preservation itself has been an established field of work in libraries for decades, whereas long-term digital preservation is still relatively new and in its infancy. In the years before and after 2006 the DNB launched projects aimed at establishing a digital preservation infrastructure and workflow-based organization, enabling it gradually to cope with the huge input of digital objects. Starting with experimental projects, the process has acquired a more managed and organized infrastructure with stabilized workflows. The result was a new working field, digital preservation, and more and more

[2] Cf. http://www.gesetze-im-internet.de/dnbg/BJNR133800006.html
[3] Cf. supplementary to the law, the Legal Deposit Regulation ("Pflichtablieferungsverordnung"), here § 8, http://www.gesetze-im-internet.de/pflav/__8.html

resources of the library were dedicated to setting up operational working structures. In comparison to physical preservation, digital preservation has some specific characteristics: the copy of a digital object is identical to the original, for example.

Confronted with these new challenges, the question arises of whether the traditional organization of preservation in the DNB is capable of reflecting the new situation. Can the DNB exploit synergies between the digital and physical preservation workflow organization?

This paper describes the former situation of the DNB, identifies the various fields of preservation, reflects upon the different challenges and examines the requirements and solutions of the DNB in terms of organization and workflow development. Here the political and operational environment in which the DNB cooperates with other institutions has to be taken into consideration.

2. DNB & Preservation: An overview

What does preservation imply for the DNB? Overall, preservation can be defined as the strategic task of curating physical objects in a way which ensures access to objects for a long(er) time. More traditionally, preservation can be defined as the physical preservation of single objects or whole collections. This means in practice the stabilization of physical material or the slowdown of natural decay processes of distinctive objects. Taking a broader perspective, curation also includes tasks such as the prevention of negative influences like temperature fluctuations, damage from water and so on. Traditionally a pyramid has been used in the archive sector to describe the different levels of action to be carried out in an organization:

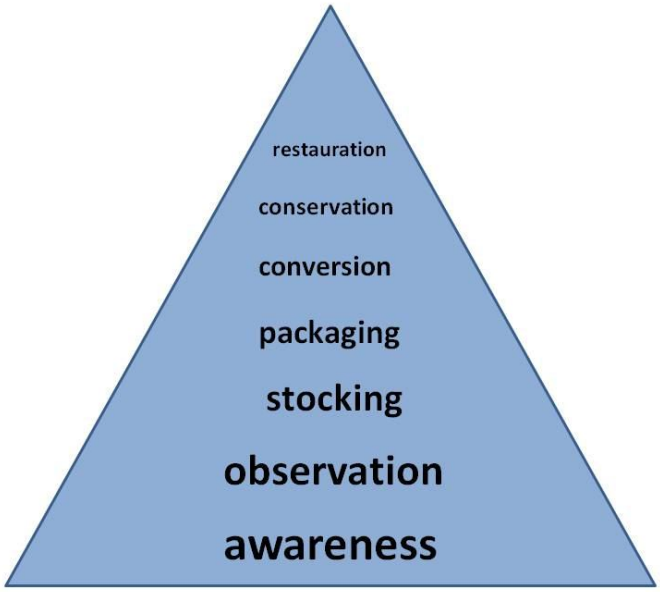

Fig.1: Range of tasks in the area of physical preservation in the DNB / schematic view[4]

[4] Cf. Cf. Barteleit, Sebastian: Vertikale und horizontale Bestandserhaltung – Einige Überlegungen zum nachhaltigen Umgang mit knappen Ressourcen. In: Für die Zukunft sichern! Bestandserhaltung analoger und digitaler Unterlagen] http://www.gsk-conservation.de/download/Vortrag_Barteleitbearb.pdf [Barteleit]; Glauert, Mario / Ruhnau, Sabine: Bestandserhaltung beginnt im Kopf, nicht im Geldbeutel. Zur Einführung. In: Verwahren, Sichern, Erhalten. Handreichung zur Bestandserhaltung in Archiven. Potsdam: 2005. http://www.uni-

Preservation starts with the need to raise awareness of the problem, well and broadly anchored in the institution, leading to common acceptance of the importance of the preservation task. The extent to which the conservation needs are recognised as a significant problem within the organization is shown by the fact that a lot of staff members are concerned with preservation, especially in the circulation / support area.
Only when these conditions are met is it possible to set up observation and planning measures. The systematic control of holdings, the availability of suitable tools, addressing the needs of treatments are key focuses of conservation. Many employees are involved at this level who are often not professionals in the area of preservation. These people therefore need specific training in detecting damage at an early stage and in carrying out the first treatments. Technical staff are also required for controlled measurement, documentation and monitoring of environmental conditions in stacks.

Building upon this general infrastructure, concrete measures such as book repair work, the packaging of the material in age-resistant cardboard, the removal of harmful accompanying materials etc., all related to individual object handling, can be taken.

Further activities that build on each other include the production of surrogate protective media (copies, film, digitization), the individual and group treatment of materials by preservation measures such as deacification and finally the restoration of individual objects up to and including the complete repair of single items. For example, newspapers have been systematically filmed, although less as a conservation measure, than as a way of saving space in the stacks and of minimizing handling costs. The filming was carried out by contractors prior to delivery of the newspapers themselves to the library. Meanwhile, this method has now been changed to a pure online workflow based on e-papers.

The less the individual measures are aligned, the greater the work involved for each specific object. In other words: the higher in the pyramid hierarchy a measure is located, the more expensive the implementation. An assessment in the DNB therefore led to the decision to finish single-sheet treatment.

Considering the situation in a more abstract way (as shown in the pyramid with hierarchically ordered measures), a vertical approach is also imaginable: as part of a systematic process each individual object is processed using a coherent set of dedicated actions[5]. The major advantage of this approach is that related work or uniform and repetitive activities can be identified and efficient workflows set up. This primarily concerns issues of workflow organization because a prerequisite for such an approach is the availability of appropriate treatment workflows (e.g. deacification) and an informational overview of stocks and working procedures. However, it is also clear that there is a limit to the quantities which can be handled because the costs per item are high and labour organization and technical resources cannot be implemented on a large scale.

But even if the “vertical” procedure described is not suitable as a general strategy, it should always be considered for parts of the holdings. As described, a prerequisite for this is good knowledge of the

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muenster.de/Forum-Bestandserhaltung/downloads/001_012_Glauert_Ruhnau_Einfuehrung.pdf.
[Glauert/Ruhnau] The figure offered in both papers was adapted here to the needs of DNB.
[5] Cf. Barteleit, p. 4

individual processes in the entire organization. The possibility of starting from such a comprehensive perspective was limited in the DNB by organizational factors.

3. Organizational situation in the DNB before 2011

Traditionally preservation in DNB was organized as an additional task within other organizational units on the one hand and dedicated workshops for bookbinding and restoration on the other hand. Some other tasks were carried out as technical services and facility management operations.

In addition to the facilities which carry out the individual treatment of materials and work very closely with the museum sector and the archival departments within the DNB, an organizational unit was established in the eighties to deal with the systematic deacification of paper-based materials, working initially only on an experimental basis.

This tradition of mass deacification in the DNB, carried out in Leipzig, led to the development of a technological solution on an industrial scale. When the method was put into effective operation at the DNB an organizational unit was established to handle the logistics. This unit took over the coordination of subcontracting to service providers and was responsible for the flow of material, for quality management and documentation. During this time, an explicit budget was established for preservation in the DNB.

In the following years, other processes for specific topics were defined and incorporated step by step in the work field of conservation / preservation.

The most important issue was the need to preserve digital objects. As a result of the new law the library was confronted with a huge number of digital objects which have to be stored safely (bitstream preservation). The whole process is covered by risk management which technically and organizationally ensures long-term access to data objects, the data formats of which are not always familiar. In the case of DNB this initial situation resulted in the development of a new ingest workflow for digital objects: objects have to be validated and checked, collected information is stored in distinct databases, and regular measures to monitor and migrate objects are still under preparation. From an organizational point of view, a new kind of department was established as a matrix group which covers a range of tasks for digital objects including preservation.

Meanwhile, digital preservation has become established in many different institutions. This field of activity is characterised by strong dependence on IT-supported processes and a high degree of automation. The need to integrate appropriate processes in the workflow for ingesting digital objects means in practice that digital preservation has become an important aspect in the processing of digital publications in general. This results in procedures which take heterogeneous aspects of digital preservation (quality assurance) into account. At the very beginning of digital preservation the ingestion process was seen as a completely independent task, while other steps such as risk management were far more theoretical in nature. A lot of attention is therefore being given to the ingestion process and the challenge of collecting and storing metadata in a professional manner. There is therefore great need for comprehensive documentation and well described processes.

Another phenomenon is the digitization issue. Digitization was first discussed in the context of conservation only as an alternative output technology to the production of microfilm, yet it has now increasingly become a primary method of preserving. During this period, preservation underwent a remarkable recovery in Germany; a number of relevant projects were funded. With the advent of digitization, the concept of grandfathering, however, adopted a supporting role, with optimization for access and advanced use options moving into the foreground. Accordingly, the idea that digitization could replace other measures is gaining importance - especially in cases of serious and irreversible damage. The classic method of preservation, microfilming, which peaked in the nineties, culminating in the political decision to invest 1% of the funds for acquisitions in the microfilming of vulnerable resources, meaning that it is losing it's importance[6].

Digitization has long since become established as a complementary if not replacement strategy by the DNB. Initially used only to protect access to existing materials and to provide at least facsimiles, systematic digitization projects are now set up with the stated aim of contributing to conservation. The DNB has now also waived the requirement for the delivery ofprinted copies of some well defined types of publications which appear in various forms.

Digitization activities also have consequences for digital preservation: every project conducted in the area of digitization produces high resolution images which have to be preserved.

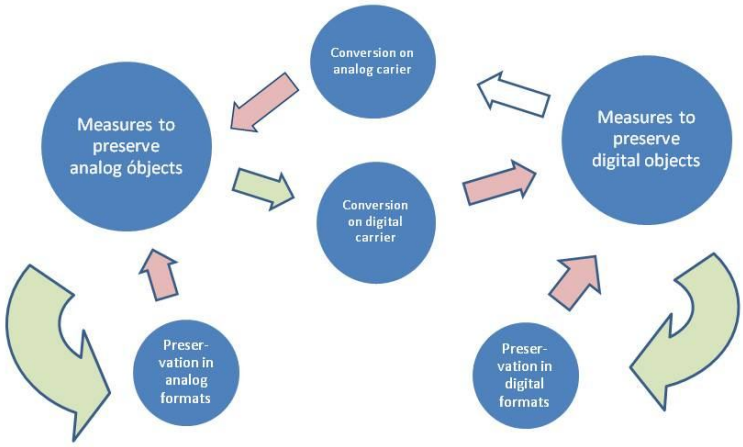

Fig. 2: **Integrated representation of measures in the area of digital preservation and digitization**

[6] Beschluss der Kultusministerkonferenz vom 08.10.1993. Sekretariat der Ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland, III A 4136/3.0. Published in: Bibliotheksdienst 28 (1994) 4, p. 479-493.

The general situation results in competitive tension between conservation based on conventional, physical objects and digital preservation, and it mirrors a much more fundamental rift in the community: on the one hand the ongoing digitization of historical printing and publishing products and the increasing delocalized library use, on the other hand valuable stocks which need continuous support and the growing need for active curation or restoration measures. It has become clear that there are no simple solutions which adequately meet the challenges. Rather, they require an appropriate decision-making procedure which takes content needs, existing conditions, as well as effectiveness aspects into consideration. A crucial prerequisite is consistent and complete status information on all media.

Another issue reflects the need to convert material: tapes, compact cassettes, floppy discs and audio-CDs are in danger of losing information. Therefore the conversion of media, especially of non-paper carriers, is becoming more and more important. In the case of the DNB it has become necessary to convert the complete Audio CD collection of about 460,000 CDs to mass storage, because the failure rates on disks had reached a degree which was no longer tolerable.

Overall, the tasks associated with conservation in the DNB wee widely distributed within the organization and many individuals often act independently of each other. There were often limited connections between processes, tools and measures which are not related to each other, and potential synergies were not considered. There was a lack of integrated decision-making and no operational concept, as there was no comprehensive reporting or monitoring. This also means that there are gaps, in particular in the coordination and regular monitoring of preventive activities. Therefore the degree of systematic development has to be extended. In addition, the coordination of processes and activities within the two locations of the library was not tight enough. This results in uncertainty, including at the practical level, on how to proceed.

Against this background, it is necessary to reorganize the field of preservation with the aim of installing transparent processes and decision-making processes that take into account relationships, continuous improvement and the final goal of meeting the needs in an integrated manner. The key objective is to harmonise the resources more effectively to leverage synergies and provide conservation as a means of obtaining comprehensive strategic control.

4. Reorganization of preservation in the DNB: approach and goals

Conservation at the DNB is implemented in many different ways: the DNB hosts a multitude of activities, it maintains a restoration workshop, the DNB has a book binding department, digitization projects are ongoing and there are also a number of relevant activities being carried out in the field of preventive conservation: deacification, evaluation projects to measure the influence of stock assessment, the degree of acidity in paper, the systematic control of temperature and humidity in the relevant stacks, regular emergency drills, the DNB is a member of the local emergency network, it has signed agreements with cold storage facilities … .

Due to various new developments the DNB was once again forced to question the importance of conservation in the institution. Who are the drivers and how can the main purposes associated with

the reorganization be identified? How can the DNB ensure that a systematic and coherent approach is chosen, not one that is based on coincidence and accidents?

This is not just a problem of terminology, rather there are practical consequences when a physical object results from a digital transformation. The mix of measures and the need to document every decision leads to a bundle of technical and organizational measures which enables us to save resources. Therefore we aime to set up a small coordination unit with many different branches within a matrix-oriented organization. Integrated workflow development, which reflects different process steps, and synergies are the crucial challenges here for the future.

What factors apply pressure for change, particularly in the area of organization?

- The pressure to save costs and human resources are strong drivers of change.
- There are growing amounts of documentation which show how effective measures are. As a consequence, decisions regarding objects and measures should be subjected to more exacting controls.
- There are better technical possibilities, especially for targeted measures.
- National and international cooperation is now much more important. For example, the recently founded "Koordinierungsstelle für die Erhaltung des schriftlichen Kulturguts (KEK)[7]", backed by the "Allianz Schriftliches Kulturgut Erhalten", a national coordinated body[8] financed by the State Minister for Culture, collects know-how on different types of institutions and has to be pushed in order to establish a national working model.
- Digitization as a new methodological approach has to be supported by defining parameters, metadata and generic working models
- Comprehensive risk management has to be implemented
- Long-term strategic planning has to take place

We need new guidelines which address the need to choose an appropriate methodology within a workflow. This requires a high degree of cost transparency and knowledge about the effectiveness of conservation measures. Proactive risk management supported by information technology is important. This allows us to record information on the status of individual objects and to determine the timing of interventions.
The importance of national and international networking is growing, with the aim of organizing cooperative action, except in the case of unique materials.

However, to facilitate an optimized approach, suitable conditions first need to be created: Cross-departmental status information, functioning information and communication structures, accurately described processes, central control options through cross-monitoring of measures and their success, a defined decision-making level, structure-specific expertise, systematic appropriation and extension of knowledge, building on external experience, intensifying training and continuing education activities, implementation of innovative or exploratory projects are the top priorities which were addressed in the initial period.

[7] http://www.kek-spk.de/home/ (in German only)
[8] http://www.allianz-kulturgut.de/die-allianz/ (in German only)

Organizationally the DNB aims for cross-departmental and cross-functional task implementation. Therefore a small unit with central and cross-site duties was founded. This new organizational unit currently has 5 employees and will be extended to around 10 people. The unit is part of another department, responsible for circulation, support and storage. The establishment of an appropriate personnel and organizational structure is an important prerequisite for achieving the required concentration for the different types of expertise spread over several departments which address aspects of conservation. Preservation has still not been comprehensively established in its various facets. A stronger concentration of the available resources has already been achieved, so that the overall topic of conservation can be considered in the planning and implementation of measures.

In addition, a staff member with overall responsibility for preservation has been appointed at the strategic management level. Therefore a mixed approach is required: On the one hand a line and staff organization, on the other hand a matrix organization which integrates several experts from different departments. Communication facilities like a wiki complement the system.

Here is a list of tasks to be implemented in the next 3 years as part of the strategic priorities of the DNB:

- Evaluation, adaptation and development of preservation strategies
- Support for a systematic prioritization process for selecting appropriate resources and methods
- Development and use of a damage map instrument, definition of benchmarks for detecting levels of damage and deterioration
- Definition of classes, stack mapping / Regular review of the inventory situation
- Upgrade of expertise for preventive planning
- Training to recognize and treat damage patterns
- Acquisition / maintenance of conservation information
- Ongoing identification and review of appropriate procedures for preservation and restoration, derivation / adaptation to the requirements of the DNB and transfer into the workflow routines
- Active participation within networks in the field of conservation
- Continuation of the master plan, strategic development
- Comprehensive emergency preparedness / emergency composite
- Public relations
- Furthermore, the unit is responsible for existing tasks, such as tendering, awarding and monitoring of measures like deacification and repair (preservation work).

One highly visible example is the coordination of sequential processes in the workflow of deacification and digitization: The necessary bibliographic preprocessing was reorganized and now meets the requirements of both workflows.

Other key activities in the field of preservation were carried out in different organizational units in 2012 in which about 120,000 volumes were processed. Protection measures such as targeted removal of media with a high degree of damage from use were also carried out. In the area of deacification, the corresponding framework contract with the service provider is about to expire, which offers the option of rethinking the strategy. Besides identifying appropriate resources, it is also important to verify selection and control processes, since it is likely that a more selective approach will be adopted in the future for deacification processing in the DNB.

A project undertaken in cooperation with two other libraries addresses the respective selection and decision-making processes on the shelf and compares the findings with the objectively evaluated results of series of measurements taken by a specialized company. As a result, all parties hope that this project will yield a clearer and more comprehensive formulation of principles of action for the required inventory selection. In addition, valuable insights for weighting individual selection criteria could be obtained.

Another ongoing activity is the integration and merging of information with respect to stock preservation. Here the distributed data management should be tied to the central bibliographic database and integrated there to make all information necessary for the long-term handling of objects accessible and machine-readable, including information on the condition and binding of works, but also the documentation of completed work such as deacification. A number of data sources need to be integrated, as some exist as non-machine-readable documents.

As a continuation of the Audio-CD disk migration project, activities are to be announced in preparation for the digitization of the compact cassettes which are also endangered and the DNB evaluation and organization workflow, followed by the actual implementation, which is also to be carried out externally.

5. Final Considerations: Realignment of preservation in the DNB

In the future it can be expected that the more digital preservation becomes established, the closer physical and digital preservation will become in their approaches. The advanced evaluation of digital objects corresponds to the need to document the treatments undertaken with regard to physical objects. In the medium and longer-term the importance of continuous monitoring and periodic object reviews increases in both processes. In this respect, the approach of digital preservation, differentiated to analyze stored materials, and to maintain information from an early stage due to existing or emerging risks with the aim of then being able to intervene in time, is also useful for the preservation of physical objects. Here the "just in case" principle is currently applied, but carrying out a special survey of risks when the materials are ingested is not common practice. The more this becomes part of general policy, the more important active processes will become in the preservation process. The later the intervention takes place, the lower the probability of being able to apply a substantial effective measure.

Another finding concerns the handling of large quantities of materials which are at risk: the limited resources mean that the complex processing in each individual case, so for example, the restoration of a single object may represent a decision against the preservation of many other objects. The solution to this problem does not lie in the application of a rule that always favours the larger amount; rather it lies in the ability to consciously take the right action in each case – knowing the alternatives.

Conservation is a cross-departmental and cross-functional task with correlated and highly interrelated requirements. The “preservation” task combines the conservation activities in various organizational units of the DNB and integrates them into a comprehensive system that is particularly suitable for making processes and relationships transparent and information tangible. This applies particularly

to the interaction between original conservation measures and conversion upon input, which is an important "migration" conservation measure in the digital domain.

Preservation is not a task that can be performed in the limited time frame of a project, many measures have to be revisited and worked on in cycles. In innovative projects, new solutions must be maintained and continued technically in migration or conversion projects. Conservation is an area of work in which large amounts of material must be handled and moved into safeguarded forms (such as digitization) as new digital objects. And further appropriate measures must be taken for the digital objects. Against this background, conservation work is a rapidly growing field with increasing demand for resources and ongoing organizational development.

So preservation is not a sporadic activity. It affects all areas of the organization that are directly or indirectly related to the storage and use of collections. Due to the variety of stocks, preservation is a heterogeneous task that requires different skills. Preservation is not a voluntary task; in the case of the DNB it arises from the legal mandate. From the points mentioned above it follows that preservation needs to be anchored within a stable inter-departmental centralized body and thereby permanently staffed and financially equipped so that it can fulfil its tasks. In addition, the unit must have the necessary skills to enforce protection and preservation measures on a permanent basis.