

Memorandum on the long-term accessibility of digital information in Germany

Digital information has become an integral part of our cultural and scientific heritage. We are increasingly confronted with scientific findings, historical events and cultural achievements presented in electronic form.

The rapid pace of technical change, however, is causing data carriers and data formats to age quickly. The result is an acute threat to the long-term usability of digital objects which serve as sources for science and research.

Long-term digital preservation allows digital objects to be accessible for use by future generations. It needs to be anchored in the social context of the national information, research and cultural policy, and the global integration of science and research. The range of tasks facing the memory institutions which supply scientific and cultural information is expanding considerably as a result. Proactive measures to preserve the long-term accessibility of digital information must be taken in conjunction with, and in addition to, existing preservation methods of non-digital media. Without such measures, there is a risk of losing important cultural objects.

Preservation of the digital heritage requires additional and sustained effort on the part of the policy makers, authors, publishers, hard and software manufacturers, and the cultural and scientific memory organisations.

The necessary framework conditions for this should be anchored in the national long-term preservation policy. This should contain intelligent strategies for preserving the knowledge manifested in digital objects, and recommend measures for their long-term preservation and accessibility in the form of a sustainable science and research policy.

The recommendations presented here are based on the results of the nestor project, on the UNESCO Charter for the preservation of the cultural heritage¹ and on the strategy papers of the research community Deutsche Forschungsgemeinschaft: "Die deutschen Archive in der Informationsgesellschaft" (German Archives in the Information Society, 2003)², "Aktuelle Anforderungen der wissenschaftlichen Informationsversorgung" (Current demands regarding provision of scientific information, 2004)³ and "Elektronisches Publizieren" (Electronic Publishing, 2005)⁴.

Responsibility for the long-term preservation of digital information

1. The preservation of digital objects is **a task of national importance**, to be undertaken in an international context. Those responsible at the federal, state and local level, and in other government and non-governmental institutions, must recognise and accept the responsibility for these tasks, and appropriate financial resources must be made available accordingly. Financing digital long-term preservation is an ongoing task, an investment for the future which should be binding upon all those involved.
2. Federal and state legislators must ensure that the tasks and objectives of digital long-term preservation are taken into account **in all the relevant areas of legislation**. The issues surrounding digital long-term preservation go beyond the regulations for archives and archiving libraries, they also carry relevance for laws regulating the creation and life cycle of digital objects.
3. Digital long-term preservation should be undertaken as part of **a partnership, with distributed task areas**. Existing responsibilities in technically, geographically or institutionally defined areas need to be carried out, as well as new responsibilities agreed and allocated. The collaboration of institutions from the different application areas of long-term digital preservation with the users in business and industry can promote the development of durable generic solutions.
4. **A sustainable coordination structure** in which the active institutions interact must be set up. Precautions need to be taken which also allow smaller institutions to carry out long-term digital preservation tasks. The durable coordination structure to be set up should: support and link the institutions tasked with long-term digital preservation, process the information, organise participation in the international discussion, propose and supervise research projects, improve initial and further long-term digital preservation training in Germany and assume other coordination tasks in the field of long-term digital preservation.
5. Long-term digital preservation must ensure the **integrity, authenticity and accessibility** of the digital objects. Appropriate organisational and technical measures need to be taken for this, including e.g. defining criteria for "trusted repositories" and organising certification based on nationally and internationally agreed procedures.
6. **Securing** digital objects **against irrevocable loss** of content needs to be guaranteed by precautionary organisational and technical measures. This should be based wherever possible on the structural redundancy and mirroring of irreplaceable data. Any loss of cultural heritage as the result of failure of any individual organisational forms, institutions and technical systems must be prevented by means of fallback strategies.

Selection, availability and access

7. Long-term digital preservation must cover **the entire spectrum** of digital objects. This includes raw scientific data, text-based documents, websites, administrative documentation, digital museum pieces, digitised content, digital photographs, films, music, multimedia objects, databases and many other software industry products.

8. In view of the large and extremely heterogeneous quantities of data it will not be possible to preserve all digital objects in all forms and versions for future generations. A **selection** therefore needs to be made - responsibly, and **based on transparent criteria**. Selection procedures should be bounded by existing or new laws and defined principles. The procedures should be coordinated jointly by the institutions involved, and already be proven, or be based on institutionally defined technical or regional factors. The availability of key raw and primary scientific data for research must be ensured through national and international agreement on the selection criteria.

9. The aim of long-term digital preservation is the **sustained availability** of digital objects via the access systems of the providing institutions. The interests of the users need to be balanced with those of the data producers and authors. From a legal viewpoint, access should be made as open as possible.

10. Users should be able to obtain the digital objects they require using **comprehensive and uniform or aligned documenting structures**. Standardised metadata and open interfaces are required, given that the objects will be stored and documented in a wide range of different systems in the future. **Persistent identifiers** should be used to ensure long-term access and citability.

11. The long-term preservation of digital objects needs to be seen within the overall **context of cultural heritage information**. Information on non-digital carriers such as paper and microfilm is being digitised on a mass scale. The concerns of long-term digital preservation need to be taken early into consideration with regard to the form of the stored data. It should be possible to search for digital and non-digital information in a uniform manner.

12. The **transparency of information, i.e. "knowledge mapping"**, should be promoted at the national and international level, by improving the documentation infrastructure and ensuring lasting availability in digital form. In conjunction with such knowledge mapping, the long-term preservation of digital objects will provide the basis for effective research and use of present-day information in the future.

Technical measures

13. The long-term preservation of digital objects requires **specialised technical systems** (long-term digital repositories). IT innovations need to be adapted and transferred to the field of long-term digital preservation, and the related systems need to be subjected to a process of continual development.

14. The long-term objective of such digital preservation is to achieve the fullest possible **preservation of content and functionality**. It is important to ensure that the original context can be reconstructed as fully as possible. The creation and storage of effective metadata is of central significance here.

15. The **use of non-proprietary, open and well-documented formats** is recommended to ensure long-term accessibility. Such formats should also be used for the creation of the information. The description, evaluation and, where appropriate, certification of the data formats which offer the best prospects for long-term accessibility should be carried out in collaboration with Germany's international partners.

Networking and training

16. Long-term digital preservation allows digital objects to be used long into the future. **Users' needs and interests** need to be taken into consideration with regard to the structural design, the content and the preservation of access to the digital repositories. This should be achieved through communication and networking between the preserving institutions and the user communities in which the knowledge contained in digital objects is developed and used.

17. In view of the rapid technological change, the long-term preserving institutions need to be fully integrated in the **national and international discussion**. Continual active participation in standardisation initiatives is a central element of the national and international communication. The successful work of the nector "Trusted Repositories - Certification" working group is a good example here. Standardisation work carried out by experts must be supported as an ongoing task in its own right.

18. Long-term digital preservation generates new tasks for the preserving institutions. **Professionally trained staff** must be used. The requirements and tasks of long-term digital preservation need to be given appropriate attention in the initial and further training programmes. Specific training courses need to be set up which sensitise their participants to specific topic areas and which also qualify them to perform the tasks at hand.

Outlook

Depending on the degree of urgency in the individual application areas, strategies and basis principles for preserving the digital heritage must be formulated, taking the given situation into account right down to the regulations operating in specific institutions. A joint discussion involving all interested parties is needed to achieve a broad consensus and a coordinated approach with regard to the choice of long-term digital preservation strategies. The framework conditions for a national long-term preservation policy described here require guidelines for daily practice to be drawn up and to be disseminated via the permanent coordination structure.

nestor - Network of Expertise in Long-Term Storage of Digital Resources

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Available online from:

http://www.digitalpreservation.de/downloads/memo2006_e.pdf

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http://portal.unesco.org/ci/en/files/13367/10700115911Charter_en.pdf/Charter_en.pdf

2

http://www.dfg.de/forschungsfoerderung/wissenschaftliche_infrastruktur/lis/download/strategiepapier_archive_informationsgesellschaft151103.pdf

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