



Digital Preservation Strategy
for
the State and University
Library, Denmark

Version 2.0

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Digital Preservation Strategy for the State and University Library, Denmark

1. Introduction

The *Digital Preservation Strategy* applies to all digital collections at the State and University Library, Denmark. The strategy has been developed to ensure that the library's digital collections are preserved in the best possible way for the future. The strategy outlines principles and priorities for carrying out digital preservation at the State and University Library. Preservation activities concerning analogue materials, including physical media with digital information such as CDs and DVDs, are not included in this strategy, but are covered by the document *Bevaringsplan* (the State and University Library's preservation plan for analogue materials).

Collections for which the State and University Library shares the curatorial responsibility with another institution, are also covered by the *Digital Preservation Strategy*. However, an individual collection plan must be developed in close cooperation with the other institution(s) which the library shares the responsibility with.

The *Digital Preservation Strategy* for the State and University Library must be seen in conjunction with a complex of policies, strategies and guidelines for the work related to handling and preserving digital material at the library. The strategy is closely connected to the State and University Library's *Digital Preservation Policy*, which outlines the framework for carrying out digital preservation at the library.

The *Digital Preservation Strategy* for the State and University Library will be reviewed and updated annually. As the official owner of the library's digital collections, the Head of the National Library Division will initiate and approve the annual revision of the strategy.

The strategy is public and is published on the website of the State and University Library.

2. Objectives

The *Digital Preservation Strategy* for the State and University Library states the library's prioritisations and principles for how to carry out preservation of digital material. The strategy thereby creates a basis for deciding how to plan and work with digital preservation at the library. The strategy ensures the taking of qualified choices of methods for preservation of digital collections for the future.

The strategy forms the basis for the ongoing selection of which digital collections must be preserved for the future, and it clarifies roles and responsibilities in connection with this. At the same time the strategy aims to ensure that digital preservation is included from the early planning of digitisation projects as well as in connection with acquisition and discarding of collections. The objective of the strategy is also to ensure that the cultural digital heritage is accessible to the library users now and in the future.



The State and University Library will implement the prioritisations and principles of the strategy in its daily work on digital preservation. Thus the strategy will help to coordinate the internal cooperation at the library as well as cooperation with external parties, including international partners. At the same time the strategy will ensure the retention of decisions and seek to ensure proper financing for digital preservation now and in the future.

Finally, the strategy outlines the guidelines for the creation of an individual preservation plan for each digital collection.

3. Preservation Framework

3.1 Roles and Responsibilities

Roles and responsibilities within the digital preservation area are allocated in accordance with regulations in DS484 (Danish standard for IT security) and the overall organisation of the functions at the library.

Roles and Responsibilities on Division level

- The IT Division is responsible for technical implementation and service of preservation systems etc.
- The National Library Division is the owner of the digital collections and as such has the overall responsibility for their preservation. The ownership includes continuous control of the digital collections, including assessment of whether the preservation means decided upon are sufficient. Decisions about preservation formats, access control, etc. are taken in consultation with the IT Division.
- The National Library Division is responsible for handling contact to producers regarding acquisition of digital collections.

Roles and Responsibilities in the IT Division's Sections

- IT Digital Preservation Technology is responsible for development and maintenance of preservation systems and systems for authorisation.
- IT Services is responsible for the security and running of IT systems, as well as development and maintenance of systems for authentication.
- IT Web is responsible for development and maintenance of access tools aimed at external users.

In all systems data loss, errors and abuse are prevented by the use of back up, regular data logging and access control as described in the State and University Library's DS 484 implementation (DS 484: Danish Standard for IT Security).

Roles and responsibilities in the National Library's Section

- The owner of the collections prioritises collections for preservation and approves the level of preservation and strategy for the collections.
- The Digital Collections Manager (DCM) creates and maintains preservation plans for each collection in accordance with section 4 in this document.
- The Digital Collections Manager (DCM) maintains a list of all digital collections.



- The Digital Collections Manager is responsible for coordinating preservation activities between the owner of the collections and the IT Division.

3.2 Knowledge Sharing and Competency Development

The State and University Library ensures that its digital preservation staff has the competencies necessary for working in the digital preservation field and staying up-to-date on the topic. Competency development is performed e.g. by involvement in national and international projects and partnerships.

The State and University Library conducts research in digital preservation as part of the institution's competency development and knowledge sharing. Research in digital preservation is conducted in agreement with the overall research policy and plans of the library, and prioritises subjects of relevance to digital preservation systems, e.g. bit preservation, and subjects related to the library's role as curator of Danish cultural heritage, e.g. audio-visual media and newspaper collections. The library prioritises cooperating in research projects and is involved in a number of national and international digital preservation partnerships and projects to ensure research, competency development and knowledge sharing in the digital preservation area.

Knowledge generated by working with digital preservation is disseminated via relevant websites and projects, e.g. www.digitalbevaring.dk.

3.3 Trustworthy Digital Repository

The State and University Library seeks to achieve the status of Trustworthy Digital Repository and thereby meet internationally acknowledged standards. This means e.g. that the State and University Library ensures integrity and authenticity in its digital preservation, including the correct and necessary metadata, and that the library meets the requirements for a digital infrastructure, organisation and documentation. At the same time it guarantees that the library has and updates its policy and strategy for digital preservation.

All components of the digital infrastructure of the State and University Library - including DOMS (The State and University Library's Digital Object Management System), in-house storage, a national bit repository, access systems etc. - must adhere to internationally recognised requirements for trustworthiness within their areas. The library will use an internationally recognised audit tool to verify trustworthiness. An audit of the library's status as Trustworthy Digital Repository must be carried out every second year. The plans and frameworks for the Trustworthy Digital Repository will be adjusted regularly and when needed. The owner of the digital collections is responsible for initiating the audit and for the follow-up in close cooperation with relevant staff and sections.

Audit of the State and University Library's preservation is the basis for conducting risk management in accordance with the requirements in DS 484, and the requirements the library has to meet in order to achieve the status of Trustworthy Digital Repository.

3.4 Registry of Data Formats

It is the responsibility of the owner of the digital collections in collaboration with the IT Division to create and maintain a list of suitable data formats. The list of approved data formats can be requested by contacting the library's Digital Collections Manager. The IT Division and the owner



of the collections cooperate with internal experts on data formats as well as with other institutions to maintain and announce information about suitable data formats.

The list of suitable data formats for digital preservation will be based on the following criteria:

- Openness of the format: Is the format well described and is documentation available? Is the format subject to any patents? Is a licence or permission required to use the format?
- Distribution of the format: Is the format used widespread? Will many programmes be able to understand the format?
- Error tolerance of the format: Will a single bit error make the whole file unreadable? Has the format been compressed (lossless or lossy data compression)?
- Acceptance of the format as a preservation format: How is the format evaluation on corresponding lists of recommended formats?
- Dependency of the format of external sources of information, for example fonts or pictures with external references.
- Ability of the format to embed data in other formats, for example embedding of video in a pdf-file.

Based on these criteria the owner of the digital collections can add a data format to the list as "Recommended" and "Accepted". The owner of the digital collections will keep a list of all data formats which have been examined by the State and University Library. The list will be an appendix to the list of approved data formats.

The list will be continuously updated as part of the preservation work. If a formerly accepted data format is no longer regarded as suitable, the owner of the digital collections must make sure that any collection containing the data format is considered for migration.

When a data format is included in the list as "Recommended" or "Accepted", the owner of the digital collections must make sure that enough information about the data format is available, e.g. version numbering, description of the data format and any limitations regarding the suitability of the data format (e.g. a prohibition on embedding of data in other data formats). For each of the data formats a technical profile must be developed. The profile describes how the State and University Library uses the data format, for example what functionalities of the data format are used and which ones are not allowed, as well as other possible recommendations such as quality (for example resolution). As a rule there should be only one recommended data format for each type of data (e.g. one for sound, one for raster graphics, one for radio recordings, one for vector graphics, one for video, one for unformatted text, and one for formatted text).

The owner of the digital collections will publish the list of data formats.

In order to identify criteria and information about data formats, the owner of the digital collections will aim to enter into co-operation with other institutions working with digital preservation.



4. Requirements for Preservation of Individual Collections

For each digital collection a preservation plan will be developed. The Digital Collections Manager is responsible for producing descriptions of the digital collections and composing preservation plans for the collections as they are ingested in DOMS.

The preservation plan covering the individual collection relates to all elements and requirements described in the following sections of this document. The preservation plans are located in the State and University Library's wiki for digital collections, which aside from the plans also has the guidelines for composing and updating preservation plans.

4.1 Legislation and Guidelines

The State and University Library's preservation of digital material follows the legislation and guidelines which the library applies to at all times. The owner of the digital collections collaborates with the library's internal adviser on legal questions in order to respond continuously to relevant legislation and guidelines. A preservation plan containing information about the legislation and guidelines which are of relevance to the specific collection is composed.

4.2 Finances

In collaboration with the IT Division the owner of the digital collections estimates the costs for preservation of each collection and documents the conclusions in the preservation plan. These parameters will support the choice of preservation strategy for each digital collection. The choice will also be dependent on the *Acquisition and Discarding policy for digital material* which describes the different data categories, according to e.g. uniqueness of the data. Parameters which can be used to estimate the costs include choice of data formats, number of copies, ingest, archival storage costs, and more.

The owner of the digital collections will stay updated on international research and work done in regards to calculating the costs of digital preservation.

4.3 Risk Management

A risk analysis is produced for each digital collection, and the risks are described in the preservation plan for the digital collection. The owner of the digital collections is responsible for preparing and updating the risk registry for each collection. The risk analysis is based on an estimation of the condition of the collection and the conclusions from the audit of the State and University Library as Trustworthy Digital Repository.

4.4 Access to Digital Collections

Continuous access to digital material is the basis of digital preservation. Aside from this, use of the digital collections does also implicitly help check preservation quality.



The State and University Library aims to provide online access to all digital collections ready for dissemination via the library's website and other dissemination channels in a technology and in a format which are of relevance to its users, see the document *Strategy for Information Flow* .

The owner of the digital collections can decide to expose digital collections through other dissemination channels, for example via an API over web services and through the OAI-PMH standard.

Defining the conditions for obtaining access to a collection is the responsibility of the owner of the digital collections, see section 4.1. Legislation and Guidelines. If the State and University Library decides that a need for broader access exists, the library ensures agreements or contracts to meet this need, see *Strategy for Information Flow*.

Information about rights is registered in DOMS, and the library ensures that all rights are kept technically and legally so no user will obtain access to material he or she has not been authorised to access.

All known information concerning access to a digital collection is described in the preservation plan for the individual collection.

4.5 Bit Preservation

The State and University Library carries out bit preservation on all digital collections as a minimum. The IT Services Department is responsible for the bit preservation activities. Service and maintenance of bit preservation systems are conducted by the IT Services Department and prospective partners.

As a minimum, the State and University Library keeps at least two copies of data. One of these is kept at the library's main address and the other copy is located at the library's facilities in Skejby, Aarhus. The two copies will be stored by using different technologies, and the library makes sure that both copies are not controlled by the same organisational unit and/or person.

Risk management and a cost benefit analysis are carried out for each collection by the owner of the digital collections. Based on these analyses the owner of the digital collections states the requirements regarding the number of copies and how frequently the control of bit integrity must be carried out. The IT Services Department is responsible for generating checksums of all files and for controlling bit integrity.

As the infrastructure of Bitmagasinet progressively becomes available, the State and University Library will use this for bit preservation.

All decisions concerning digital preservation are documented in the preservation plan for the individual collection.

4.6 Functional Preservation

The State and University Library aims to preserve the functionality of a digital collection either by migrating data to new data formats or emulating the original systems to be able to access data. As a rule functional preservation is performed in the library's Digital Object Management System (DOMS).



If preservation responsibilities for a collection are shared with one or more partners, the digital collection can be preserved in another system than DOMS.

4.6.1 Ingest

It is the responsibility of the owner of the digital collections to make the arrangements necessary to ingest collections into DOMS so that the data can be functionally preserved. The system owner of DOMS is responsible for performing the actual ingest of the collections.

Once it has been decided to ingest a collection into DOMS, the owner of the digital collections decides whether migration of the collection is needed before ingest. Data only undergoes migration if the original data formats are not suitable for digital preservation. The owner of the digital collections can decide if the digital collection should undergo emulation or filming, if the data formats are not suitable for digital preservation and migration is not an option.

As far as possible the owner of the digital collections will attempt to ensure that the digital collection exists in a suitable data format and will document the data format in the preservation plan.

When the State and University Library itself is the source of digital material, for example in case of digitisation (in-house as well as outsourced) the owner of the digital collections will always choose a suitable data format. When the library receives a collection from an external source, the owner of the digital collections will attempt to influence the provider to deliver the collection in a suitable data format. If this is not possible, the owner of the digital collections will decide if the data format which the collection will be delivered in can be approved as a data format suitable for preservation. If the suggested data format cannot be approved, the owner of the digital collections will decide if it is necessary to let the digital collection undergo migration at its reception at the library.

DOMS always validates data formats at ingest. The system owner of DOMS in collaboration with the owner of the digital collections is responsible for handling objects with validation errors.

Decisions concerning preservation actions are documented in the preservation plan.

4.6.2 Continuous Monitoring

Once a collection has been ingested into DOMS it is the responsibility of the owner of the digital collections to monitor whether the collection's data formats are still suitable for preservation. If this is no longer the case, the owner of the digital collections will decide if migration is necessary. If migration is not an option, the owner of the digital collections can decide to let the digital collection undergo emulation or filming.

The preservation plan documents how monitoring of the data formats of the digital collection should be carried out.

4.6.3. Preservation Action - Migration

When using migration the owner of the digital collections must choose a suitable data format for the method. Evaluation of the suitability of the migration data format is based on the following criteria:

- Suitability of the new data format for long term preservation (for more information, read paragraph 3.4 Data Formats),



- Preservation of significant properties (for a chosen target audience) (e.g. content, layout, embedded metadata, possibilities for interaction),
- The accessibility and quality of the migration tools and
- The cost of migration.

The owner of the digital collections will use an appropriate tool and/or a method to estimate the migration possibilities and risks. As a rule both the original and all migration copies will be preserved. The owner of the digital collections can decide to deviate from this principle on the basis of costs compared to the quality of migration, i.e. the preserved properties from the original to the migration copy. The system owner of DOMS is responsible for carrying out the migration and documenting the process in DOMS.

Preservation actions are documented in the preservation plan.

4.6.4 Preservation Action - Emulation

If it is not possible to use migration for a collection (or threatened parts of this) in a way so that the collection can be accessed in the future, the owner of the digital collections can decide to make use of emulation

Migration can be opted out if, for instance, it is not possible to find a migration path that preserves the significant properties, or if migration is not cost-effective due to e.g. large amounts of different data formats in the collection. If the owner of the digital collections decides that emulation is a reasonable alternative to migration, the owner will contact a partner with expertise in emulation in order to establish an emulation platform with access to the collection data. The system owner of DOMS will cooperate with the emulation partner regarding the technical set-up of the emulation platform.

Preservation actions are documented in the preservation plan.

4.6.5 Preservation Action - Filming

If the owner of the digital collections and the system owner of DOMS deem it unrealistic to preserve an interactive collection by emulation, but the digital collection owner still finds the collection to be of such value that certain properties of the collection must be preserved, the owner of the digital collections can ask a business partner if they would like to film the content and use of the collection. Ingest of these files must be conducted in accordance with the preservation principles which concern ingest of digital collections at the library.

Preservation actions are documented in the preservation plan.

4.7 Metadata

The owner of the digital collections is responsible for defining a minimum level for metadata which is described in the preservation plan for the individual collection. The owner of the digital collections ensures that all digital collections are registered when received at the library. In connection with digitisation, documentation should include relevant metadata, including data generated during the digitisation process. The revision history is preserved in the metadata.

Metadata for all collections is preserved in DOMS and separated from the digital files. Some files may have embedded metadata, e.g. generated during the digitisation process. These metadata will, if possible, be extracted and preserved with other metadata in DOMS, but will also remain in the actual files and will be sought preserved in future migrations.



A data model for the individual digital collection will be designed before ingest in DOMS. The data model will be composed in collaboration with the library's Metadata Team. It is the responsibility of the owner of the digital collections to maintain the data model. The data model is attached to the preservation plan for the digital collection.

The metadata standards in use at the library are described in the appendix *Metadata*, which can be requested by contacting the Digital Collections Manager. Monitoring the international development in metadata standards includes descriptive, administrative (including technical) and structural metadata.

4.8 Quality Control of Digital Collections

When receiving a digital collection the quality of the collection will be investigated by checking the following elements: File structure, data files and metadata. The results of the control are documented in the preservation plan for the individual digital collection.

4.9. Resource Persons

The preservation plan for a digital collection must list the names and contact information of persons who hold special information about the content and preservation of the collection. The resource persons for a given collection can be external parties as well as internal members of staff who have important knowledge of the collection. This can be information about the content and history of the collection or information about the data formats, preservation history, metadata, and more.

5. Sources of Inspiration and Related Documents

5.1 Sources of Inspiration

The following documents have been sources of inspiration for the preparation of the *Digital Preservation Strategy*.

JISC report: *Digital Preservation Study* (2008)

http://www.jisc.ac.uk/media/documents/programmes/preservation/jiscpolicy_p1finalreport.pdf

Det Kongelige Bibliotek: *Politik for langtidsbevaring af digitalt materiale* (2009)

http://www.kb.dk/export/sites/kb_dk/da/kb/downloadfiler/bevaringspolitik_kb_2009.pdf

The National Library of Australia: *Digital Preservation Policy* (3rd Edition) (2008)

<http://www.nla.gov.au/policy/digpres.html>

British Library: *British Library Digital Preservation Strategy* (2006)

<http://www.bl.uk/aboutus/stratpolprog/ccare/introduction/digital/digpresstrat.pdf>



5.2 Internal Documents related to the Digital Preservation Strategy

The following documents and draft texts have been used in the process of developing the *Digital Preservation Strategy*.

- Statsbibliotekets *Politik for digital bevaring (Digital Preservation Policy for the State and University Library)*
- Statsbibliotekets *Kassation- og accessionspolitik for digitalt materiale (Acquisition and Discarding Policy of Digital Material for the State and University Library - in preparation)*
- Statsbibliotekets *Digitaliseringsstrategi (Digitisation Strategy for the State and University Library - in preparation)*
- Bevaringsplan (2003) (Preservation Plan for Analogue Material)
- *Strategi for informationsforsyning (2012) (Strategy for Information Flow)*

The following appendixes can be requested by contacting the Digital Collections Manager at the State and University Library:

Appendix a for *Strategy for Digital Preservation: Metadata Standards*

Appendix b for *Strategy for Digital Preservation: Projects*



6. Definitions

The State and University Library's definitions of the following phrases:

- **API**
Software interface allowing software to interact with other software
- **Bitmagasinet**
Bitmagasinet is the State and University Library's primary system for bit preservation. It is the result of collaboration between the State Archives, the Royal Library and the State and University Library with the purpose of guaranteeing bit preservation of digital material.
- **Copy**
One among a number of identical duplicates of the same file which is preserved for the purpose of completing regular integrity checks
- **Digital collection**
Collection of digital files and metadata which can be seen as a whole, e.g. defined by content or data formats
- **Digital Collections Manager (DCM)**
Function in the National Library Division which is responsible for administration of the digital collections at the State and University Library.
- **Digital Collections Wiki**
Wiki used for collecting information and decisions concerning the State and University Library's digital collections.
- **Dissemination copy**
Copy of original digital material used for dissemination purposes. A dissemination copy emphasises the possibility of disseminating content to users.
- **DOMS**
The State and University Library's Digital Object Management System which has been developed in order to preserve and administer the digital collections at the library
- **Metadata Team**
The Metadata Team at the State and University Library coordinates cross-section efforts at the library with the purpose of staying up to date with the development in metadata standards and paying attention to changes, amendments and best practice, as well as compose guidelines/rules for registration in order to guarantee a uniform use of the standards.
- **Migration copy**
A new version of a file in a different data format. A migration copy can be created from both the original and from a previously generated migration copy
- **On demand**
A digital collection is not migrated or copied until there is a specific need for this, for example if a user requests the material.
- **Preservation copy**



Copy of original digital material needed for long term preservation. In a preservation copy features like long lasting formats which enhance long term preservation are prioritised.

- **OAI-PMH**
Open Archive Initiatives-Protocol for Metadata Harvesting
- **Original**
The original file which is used for generating subsequent copies
- **Owner of the digital collections**
The role responsible for the digital collections, including maintenance, preservation and dissemination of the digital collections. At the State and University Library the Head of the National Library Division is the owner of the library's analogue and digital collections
- **Rights management**
Management of access rights to preserved or disseminated files.
- **The State and University Library's digital archive**
The total amount of digital collections at the State and University Library and the preservation and organisation of these
- **System owner**
The role responsible for maintenance and service vital for performing digital preservation. The Head of the IT Department is the system owner in relation to systems used for digital preservation

The State and University Library defines the following terms in accordance with the descriptions at www.digitalbevaring.dk (in Danish):

- Bitbevaring (Bit preservation)
- Checksum (Checksum)
- Dataformat (Data format)
- Digital bevaring (Digital preservation)
- Emulering (Emulation)
- Format (Format)
- Funktionel bevaring (logisk bevaring) (Functional preservation)
- Metadata (Metadata)
- Migrering (Migration)
- Museal strategi (Technology preservation)
- Risikovurdering (Risk management)