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*IASA-TC 03 und 04*

Standards Related to the Long-Term Preservation  
and Digitisation of Sound Recordings

*Europas kulturelles und wissenschaftliches Erbe in einer digitalen Welt  
Berlin, 21.-22. Februar 2007*

## **Traditional text documents and museum objects:**

- Digitisation is a tool for making cultural contents accessible
- Original documents/ objects are preserved
- Digitisation is an indirect measure for preservation

## **Audio (and video) recordings:**

Digitisation indispensable for long term preservation

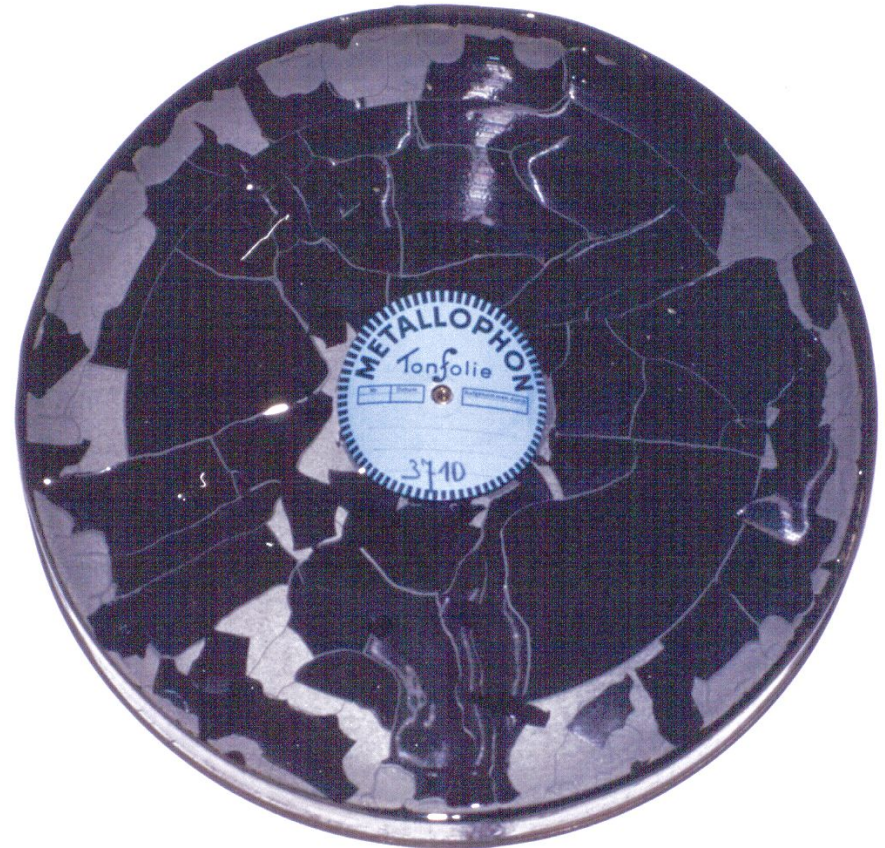
## Audio carriers are unstable:

- Cylinders are brittle and mouldy
- Instantaneous discs reach EOL (end of life)
- Historical tapes become brittle and unplayable
- **Modern tape suffer from pigment binder degradation**
- Latest tape generation endangered by pigment oxidation
- **Recordable optical discs (CDs, DVDs) most endangered carriers of all**

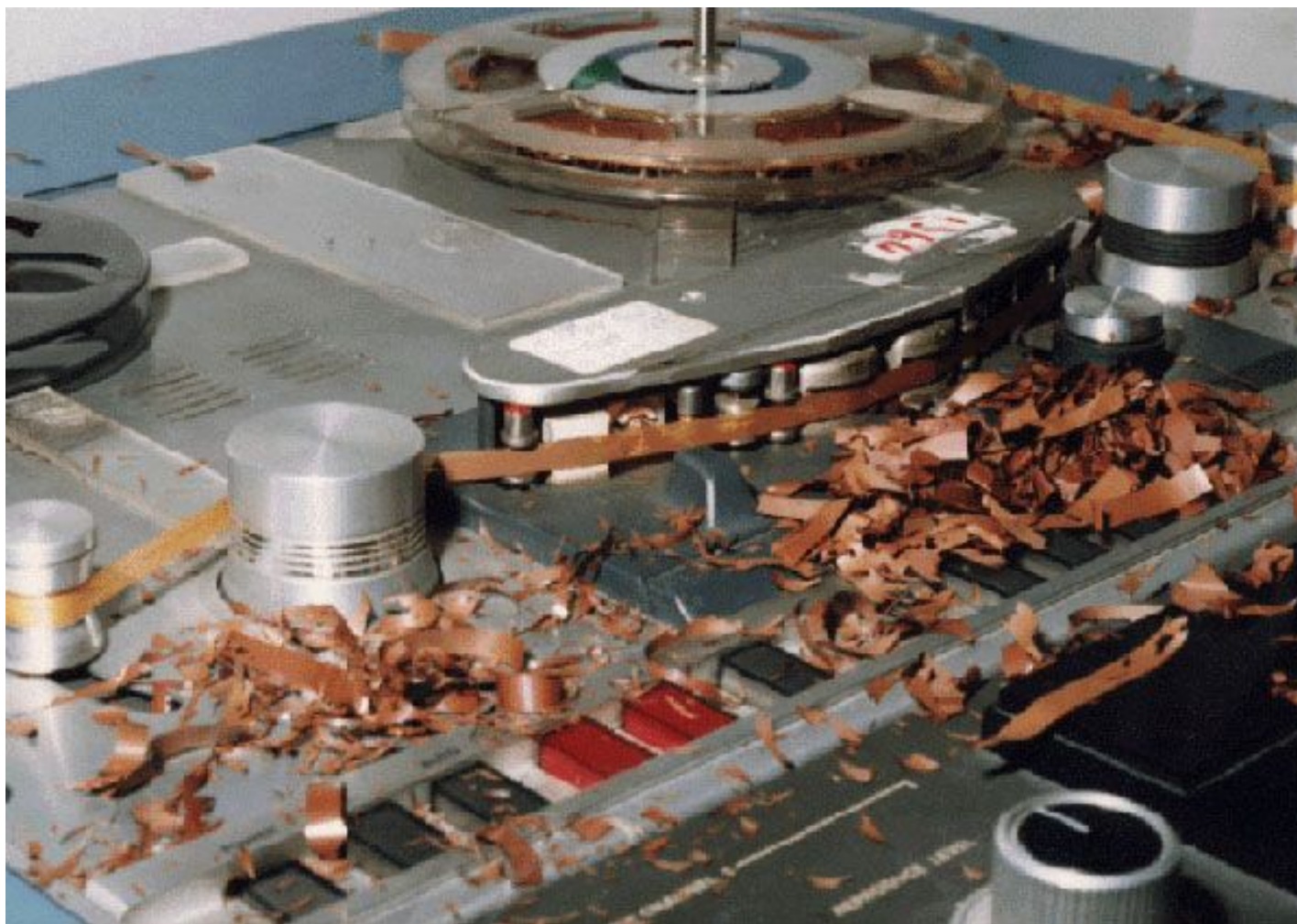
**instantaneous disc 1990**



**2001**



## Ultimate state of pigment binder degradation



## **Audio (and video) recordings are machine readable documents**

Format and specific replay equipment became ever more sophisticated

Life cycles of formats became ever shorter

Almost all dedicated audio formats are already dead, video about to follow

Obsolescence of formats and replay equipment considered to even higher threat than carrier degradation

## Format obsolescence and availability of equipment audio

format	obsolete		equipment
	now	soon	
cylinders	x		specialist only
coarse groove discs	x		specialist only
micro groove discs (vinyls)	x		fading out
quarter inch tape	x		fading out
micro cassettes	x		fading out
compact cassette		?	?
R-Dat	x		fading out
MiniDisc		?	?

**Around 1990 shift of preservation paradigm:**

***Traditional paradigm of archives (and museums):***

***Preserve the **original*****

**However:**

Long term preservation of

- deteriorating original audio (and video) documents
- machines of all formats and their spare parts

is **hopeless!**

Audio (and video) preservation must be based on  
subsequent digital (=lossless) copying of **contents**

## **New paradigm was initially not unanimously accepted**

ARD-Radio Archives started DMSS pilot projects in 1992

National archives following

Research archives: small scale, manual approaches

### **Audio holdings (estimated):**

- 100 million hours world wide
- more than 50% in Europe (!)

*International Association of Sound and Audiovisual  
Archives (IASA)*

*Technical Committee*

*Standards, and Recommended Practices and Strategies*

IASA-TC 03

The Safeguarding of the Audio Heritage:  
Ethics, Principles and Preservation Strategy

Version 3, December 2005  
edited by Dietrich Schüller

Editor *Dietrich Schüller*

Contributors *George Boston, George Brock-Nannestad,  
Lars Gaustad, Albrecht Häfner, Dietrich  
Schüller and Tommy Sjöberg*

Reviewed by the *IASA Technical Committee*

## Background

Internal aim: to reach consensus amongst preservation specialists and to spread consensus amongst audiovisual archivists

External aim: to furnish audiovisual archivists with a referable, internationally acknowledged document in their struggle for appropriate funding.

## History

Version 1 February 1997

- Although digital archiving was already widespread, analogue archival masters still recommended
- However: Core principles of digital archiving were already defined

## Version 2, September 2001

- Viability of digital archiving unanimously accepted
- Major rearrangement of contents
- Practical matters included

Version 3, December 2005

Alignment to IASA-TC 04 (published 2004)

- TC 03: Principles
- TC 04: Practices
- Consequently, practical matters eliminated in TC 03
- Sequence of issues aligned to TC 04

## 0. Ethical considerations

*“TC 03 is not a Code of Ethics for all aspects of sound archiving. It covers, however, the ethical consequences resulting from the technical aspects of recording, preserving and accessing sound documents within the framework of the technical development offered by today’s market situation”*

1. The task of sound archives
2. Primary and secondary information
3. The instability and vulnerability of audio carriers
4. Obsolescence of formats
5. Safeguarding the information
  - a. By preservation of the carrier
  - b. By subsequent copying of the information
6. Selection of best copy and carrier restoration

## 7. Optimal signal retrieval from original carriers

- Determines signal quality for the rest of document's life
- Use latest generation equipment (adapted to historical formats)
- Transfer may be a once-and-only process because of carrier degradation and financial constraints
- Still: keep originals for later consultation

## 8. Unmodified transfer to a new target format

- No restoration = aesthetical improvement permitted in archival transfer
- Signal processing is a second step after transfer

## 9. Improvements in transfer technologies

## 10. Digital target formats and resolution

- Employ openly defined formats only
- File formats to be preferred over data streams (e.g. CD-audio)
- Recommended: .wav (BWF)

## 11. Data reduction

- Powerful tool for dissemination, however
- Not permitted for archiving of analogue or linear digital originals

## 12. Digital archiving principles

- Data integrity check after production and in regular intervals
- Refresh before content becomes irretrievable
- Migrate to new storage system before old becomes obsolete

13. Digital mass storage systems (DMSS)

14. Solutions before DMSSs become affordable: Small scale manual approaches to digital storage

15. Preservation metadata

16. Strategy

Apart from carrier degradation, recent development suggests that format obsolescence and the associated unavailability of replay equipment may become an equal, if not greater threat for the future retrievability of information – time window may be 15 – 20 years only

17. Co-operation

18. Maintaining the knowledge base of archives

Print version

Web version

[http://www.iasa-web.org/TC 03 Version 3 \(2\).pdf](http://www.iasa-web.org/TC_03_Version_3_(2).pdf)

March 2007: German, French, Spanish, and Swedish translations available from IASA website

Later 2007: Russian and Chinese

*IASA Technical Committee*  
*Standards, and Recommended Practices and Strategies*

# IASA-TC 04

## Guidelines on the Production and Preservation of Digital Audio Objects

Version 1, 2004  
edited by Kevin Bradley

Editor            Kevin Bradley

Contributors   Kevin Bradley, George Brock-Nannestad,  
                  Mathew Davis, Lars Gaustad, Ian Gilmour, Michael  
                  Risnyovszky, Albrecht Häfner, Dietrich Schüller, Lloyd  
                  Stickells, Jim Wheeler

Reviewed by the IASA Technical Committee

Practical complement to

*IASA-TC 03*

*The Safeguarding of the Audio Heritage*

*Ethics, Principles and Preservation Strategy*

*Version 1 1997*

*Version 2 2001*

*Version 3 2005*

1. Metadata
2. Background
3. Key Digital Principles and Standards
4. Unique and Persistent Identifiers
5. Signal Extraction from Originals
6. Preservation Target Formats and Systems
7. Bibliography
8. Index

## *Key Digital Principles and Standards*

- Stand alone A/D converter
  - minimum specifications
- Linear PCM
- Minimum resolution 48 kHz 24 bit
- .wav – BWF
- No data reduction (“compression”)  
for analogue or linear digital originals

## *Signal extraction from originals*

Historical formats	Selection of best copy
Microgroove discs	Cleaning, restoration
Analogue magnetic tapes	Replay equipment
Digital magnetic carriers	Speed
Optical disk media	Replay equalisation
	Correction for misaligned recording equipment
	Removal storage artefacts
	Time factor

## *Time factor – relation document's duration vs processing time for one operator*

- Most underrated element in transfer projects
- Well documented tape: 2-3
- Inhomogeneous collections, historical materials >3 – open ended
- “Factory” transfer cost intensive and not applicable to average heritage/memory institutions
- In view of 100 Mh (million hours) worldwide, over 50 Mh in Europe, digitisation has a job-creative dimension

## *Preservation Target Formats and Systems*

Data and audio specific storage technology

Digital mass storage systems (DMSS)

Data tape types and formats

Hard disk drives

Small scale manual approaches to digital storage

Optical disks: recordable CD/DVD

Magneto-optical disks

## *Optical disks: recordable CD/DVD*

- Explains complexity of drive/blank/speed compatibility and its influence on recording quality
- Imperative: selection of blanks by appropriate testing, and testing of every recorded disk
- Defines maximal acceptable error levels

FBE: < 6, BLER average: < 10, BLER peak: < 50, E 22 and E 32: 0

However, reliable testing hardly affordable – therefore:

**Discourages the use of recordable CD/DVD for institutions that cannot afford complex testing**

**Important issue beyond audio archiving**

IASA-TC 04 available in Spanish (2006) and Italian  
(2007)

Version 2 under preparation for 2008

## Memory of the World Programme - Sub-Committee on Technology

*Kevin Bradley:*

*Risks Associated with the Use of Recordable CDs and  
DVDs as Reliable Storage Media in Archival  
Collection – Strategies and Alternatives.*

<http://www.unesco.org/webworld/risk>

**Thank you!**

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