Dietrich Schüller

Safeguarding audiovisual information for future generations

Inforum 2016 Prague
24-25 May 2016

5000 years of text documents

information in form of *human thoughts* represented by script

Audiovisual documents

machine made *representations of acoustical and/or optical phenomena*

- photographs 1839
- sound records 1877
- films 1895

All, except photographs, are machine readable documents

Development of audiovisual technology was driven by scientific interest:

- exploration of the physics of human language
- interest for folk and exotic musics and languages
- detailed movement studies

Scholars systematically used Edison cylinder phonograph since 1890

Recorded sound collections emerged at research institutions and museums

Consequently, first sound archives were founded by academic institutions:

Vienna Phonogrammarchiv 1899

Berlin Phonogrammarchiv 1900

St. Petersburg Phonogrammarchiv 1908

Entertainment record and film industry emerged soon after technology was available

- Film 1895
- Phonographic industry 1898

Radio broadcasting started in in the 1920s

Systematic national and radio collections followed 1920/30s

- Discoteca di Stato, Italy
- Phonothèque Nationale, France
- Music Division, Library of Congress, USA
- Film archives in Netherlands, UK, Soviet Union
- BBC radio archive

Consolidation and mushrooming of audiovisual archives after WW 2, supported by availability of magnetic recording technology for audio and video

Audiovisual legacy originates from three creative sectors

- Audiovisual industry

  documents of art in their own right
- Radio and television broadcasters

  “documents of modernity”
- Academia

  documents of the linguistic and cultural diversity of human kind

The challenges of audiovisual preservation

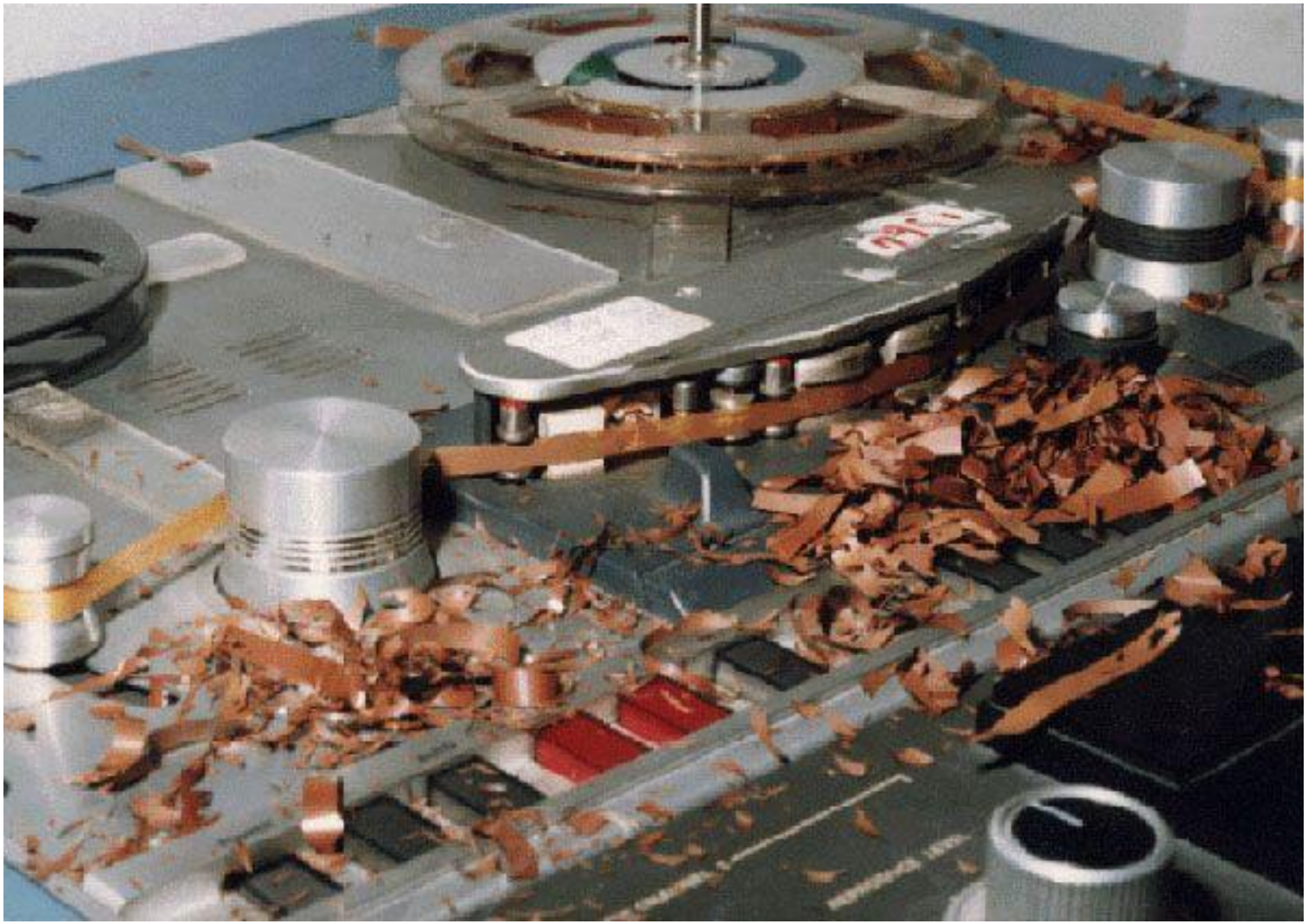
- unstable materials
- machine readable documents (except photographs) threatened by format obsolescence and unavailability of dedicated replay equipment

Instantaneous disc

1990

2001

1990: Ultimate fate of ALL magnetic tapes ?
2012: Production accident !



Deteriorated nitrate cellulose film

Preservation paradigm: *archives and museums preserve the objects placed in their care*

- Archives and museums are repositories of ***originals***
- *Copies* are useful *working tools*, indirectly assisting the preservation of originals by minimising their handling
- Copies are never fully replacing originals

Originally, sound and film archives followed of this principle, despite awareness of:

- limited life expectancy of their carriers, *e.g. cylinders, instantaneous discs, nitrate film, magnetic tapes*
- loss of quality by analogue copying

Strategy:

- “one copy is no copy”
- “untouchable” originals (archival masters)
- optimise storage conditions
- routine access only by working (access) copies

Format obsolescence was originally not a matter of serious concern:

- cylinders 1880s - late 1920s
- coarse groove discs: late 1890s – mid 1950s
- micro groove discs: since late 1940s
- magnetic tape: since mid 1930s/late 1940s

In comparison to digital formats: low sophistication of replay equipment

Situation of the 1980s

Arrival of digital audio

Expectation: a stable digital format optimised for archival purposes

However, the opposite happened: life cycles of formats became ever shorter

Consumer market products entered professional world, e.g. R-DAT

Change of paradigm started May 1989 UNESCO meeting:

Sooner or later, ALL audio carriers will decay beyond retrievability → optimisation of carrier preservation would ultimately be in vain

Sooner or later, ALL carrier formats would also become obsolete

Spare part production and availability of replay machines in operable condition will fade

Even carriers in excellent condition will become useless

Long-term preservation can only be achieved by digital (= lossless) subsequent copying of contents

Analogue contents have to be digitized first

Digital preservation management (data integrity checking, refreshment, and migration to new preservation platforms) must be automated

First public debate: Joint Technical Symposium, Ottawa, May 1990

Towards the Automated "Eternal" Sound Archive

Mixed perception:

Partly positive, but sceptical ("utopian")

Partly negative: betrayal of archival principles

Development was pushed by European Public Broadcasters

Incentive: to use archival assets as weapon against private broadcasters

1992/93 ARD (Südwestfunk Baden-Baden) in cooperation with IBM: first pilot project to develop a “Digital Mass Storage System” for sound archiving

ARD Archiv-Arbeitsgruppe decides on the “Lineares Funkhaus”: no data reduction in production and archiving, only for transmission

EBU decides to extend the Wave format to BWF

IRT (Institut für Rundfunktechnik) designs “Quadriga”, computer aided ingest station for A/D transfer

In Europe, by the later1990s, sound archiving has become part of the IT world

Broadcast sound archives took the lead

Storage costs came down towards 2000

Broadcast audio archives were followed by

- national sound archives
- research archives
- video archives

Digital Mass Stores: originally near-line tape robotic systems, gradually changing towards hard disk drive on-line systems

2007 storage costs (of systems >100TB) 7-9 €/GB/year

Today < 1€/GB/year

Price reduction flattening out

Today, subsequent digital content migration is an undisputed principle for audio and video archiving

More recently, even film archivists joined in

after some reluctance, even opposition

Archival principles

following IASA TC 03 and TC 04

Complete extraction of signal from original carrier

However: transfer technology may improve – keep originals as long as possible

No proprietary digital target formats

Audio: .wav (BWF) international de-facto standard, video: debate between uncompressed of lossless compression

Unmodified transfer of contents

Signal restoration as a second step only

No data reduction (“compression”) for analogue and linear digital originals

Archival principles cont'd

Check data integrity in regular intervals

Refresh data if needed

Migrate data to new storage systems before they become obsolete

Separation of content from carrier makes metadata important:

descriptive and administrative, plus *preservation* metadata

- format and state of preservation of original carrier,
- all equipment and parameters used for replay and digitisation
- digital format and resolution
- checksum
- operator

Nota bene:

IASA recommendations view originals as an *information carriers*

Modern signal extraction delivers what is found on carrier, not what was heard at the time

Audiovisual carriers as *art objects* and historic reproduction require different approaches

video art, historic film screening

Fear of the 1970s -1990s: instability of carriers

Breakdown of magnetic tape pigment binder on a great scale - the fear of the 1990s – did NOT happen

However: considerable problems with some historical cellulose acetate tapes

Cellulose acetate tape used from 1950s to 1970s from Eastern Germany to Vietnam

Bittle and - if at all possible - very difficult to replay

Re-conditioning possible…

Tape on reel after re-conditioning

Lack of replay equipment and expertise

As formats change, industry withdraws from spare part supply and service support

Specifically endangered: magnetic tape formats

Digitisation is urgent!

Time window left 10-15 years, if at all

Global perspective

- Broadcast and national archives of wealthy countries have already, or will (selectively) safeguard their audio and video holdings in time
- Substantial support by EU-funded Presto project family
- Less wealthy countries may have a problem to organise and finance ingest into digital repositories in time
- Vanishing replay equipment and expertise calls for strategic planning and cooperative solutions
  Media Digitization and Preservation Initiative Indiana University

UNESCO’s specific concern:

Audio and video recordings are the sources proper for orally transmitted cultures and the documents of cultural and linguistic diversity of mankind

Majority of these documents: part of notoriously underfunded institutions, or outside archives archival custody (in a narrower sense)

Inhomogeneous collections – factory transfer not applicable

Imminent danger to lose audio and video documents by unavailability of replay equipment

Project “Magnetic Tape Alert” to warn governments and stakeholders of such unprecedented loss

Summary

Audiovisual preservation by subsequent content migration is viable – and with out realistic alternative

Magnetic formats cannot wait

Key to success is timely strategic planning,. preferably at national levels

Thank you !

dietrich.schueller@oeaw.ac.at
www.phonogrammarchiv.at