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“Some believe that the challenge of preserving sound recording collections is narrow and easily framed—simply a matter of copying old recordings to a new medium. The preservation process, however, entails much more than transferring a recording and saving it as a digital file; indeed, these two steps fall somewhere in the middle of a lengthy chain of events.”

The preservation of recorded sound collections entails a set of processes requiring careful planning and a sophisticated technical infrastructure. It comprises several steps and requires important decisions that will affect what recordings are saved and what compromises may have to be made to ensure that the greatest number of recordings will be saved.”

-The State of Recorded Sound Preservation in the United States. Council on Library and Information Resources and The Library of Congress. August 2010.

So what really is “A/V (Media) Preservation???”

- **Conservation:** Safeguarding and protection of original materials from damage. Involves hands-on intervention and repair of physical materials.
- **Preservation**: All actions taken to maintain an object in its existing condition, minimize the rate of change, and slow down further deterioration. Includes duplication, copying, or migration of objects with limited life expectancy
- **Restoration:** Actions taken to modify the existing material and structure of an object in order to return it to a known earlier condition, e.g. as new, or original.

So what really is “A/V (Media) Preservation???”

- ***"Preservation is the totality of the steps necessary to ensure the permanent accessibility – forever - of an audiovisual document with the maximum integrity “***

  -CCAAA

- In reality, A/V Preservation includes preservation, conservation *and* restoration.

Whats the landscape look like?

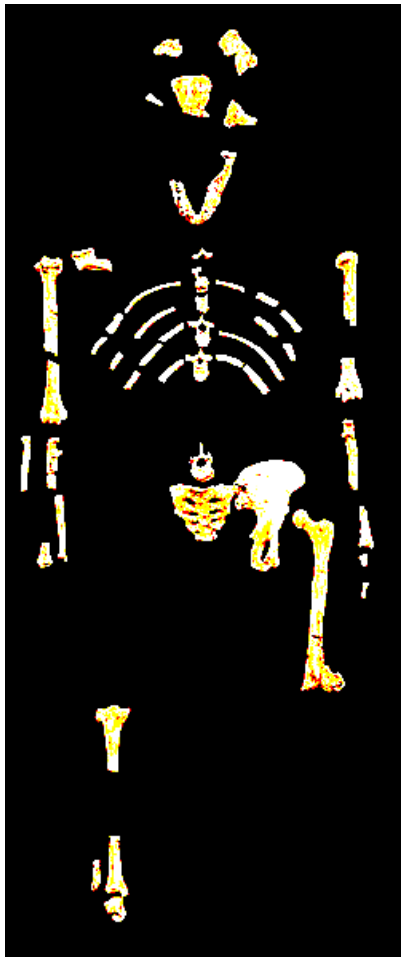
- Wide range of collection types.
- Vast multitude of formats and carriers.
- Wide range of asset conditions: from pristine to severely degraded.
- Wide range of storage conditions: from excellent to extremely poor.
- Wide range of cataloging, metadata and documentation: from excellent to nonexistent.
- Preservation and digital migration has occurred in bits and pieces across many collections.
- Some policies and standards in place, but are constantly changing.

What are the A/V Preservation Challenges?

- Large portions of collections are in danger due to:
  - Format obsolescence and media degradation
  - Playback / Recording equipment obsolescence
  - Inadequate storage and Assessment Difficulties
  - Inadequate or nonexistent cataloging or inventories
  - Knowledge obsolescence!!

Why Should We be Concerned?

- Our recorded history
  - “Lucy” (Australopithecus) = 3.1 million years
  - Rock Art in Spain = 40,000 years
  - Clay Tablets from Mesopotamia = ~5000 yrs
  - Books from Middle Ages = 800 years
  - Film, 100+ years
  - Videotape and Audiotape, years
  - Digital : ???? (some already obsolete)



Where do we even begin?

- Some basic questions:
- ***What does a collection have?***
- ***Where is it located and what is its condition?***
- ***How is it currently accessed?***
- ***How do I preserve it?***

What do you have??
Film / Video Formats

35mm film

16mm film

Super 16mm film

8mm film

Super 8mm film

70mm film

2” quad

1” : Types A,B,C

3/4” Umatic

1/2” VHS

Betacam

BetacamSP

BetacamSX

Digital betacam

Dvcam

Dvcpro

Hi-8

D-1

D-2

D-3

D-5 HD

HDcam

HDcamSR

DVCPro-HD

DV-HD

DVD

Data Tape

HDD (Hard-disc drive)

“Born digital” media: # of formats

Common Video Formats

Video Playback Equipment

Audio Formats

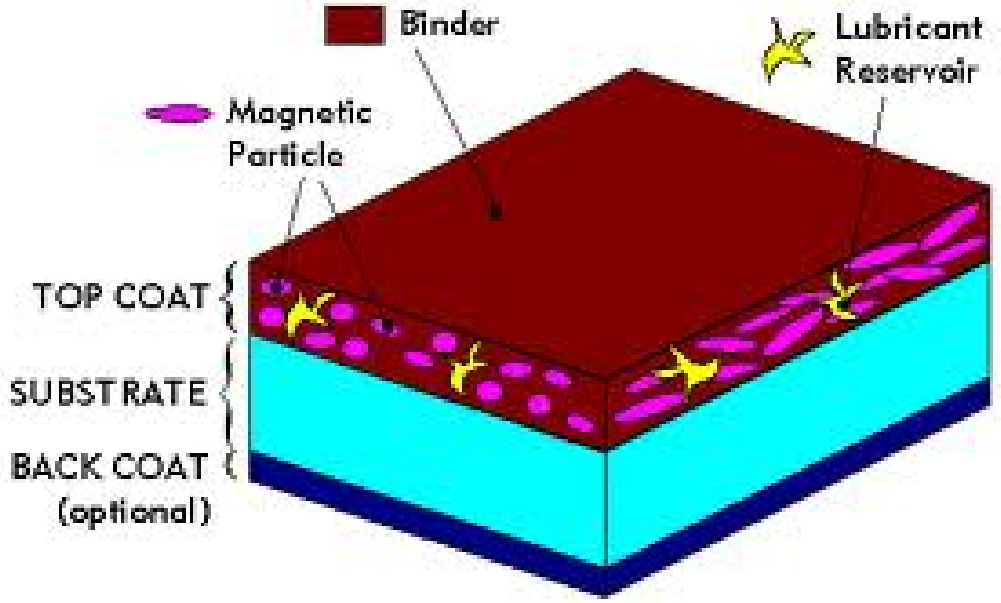
- 16mm mag tracks
- 35mm mag tracks
- Various optical tracks
- 2”
- 1”
- Commercial LP disc
- Open reel tape
- CD (Compact Disc)
- Commercial 78 rpm disc
- Analog, audio
- cassette tape
- CD-R
- Lacquer disc
- Cylinder recording
- Commercial 45 rpm disc
- Aluminum disc
- DA78/88 tapes
- Wire recording
- Betamax (Sony PCM-F1 digital audio)
- Microcassette
- Audiograph Disc
- Eight Track Tape
- Fidelipac (audio tape cartridge)
- SVHS (digital audio)
- Minicassette
- Digital Files: Various Formats
- DAT (Digital Audio Tape)

Common Audio Formats

Audio Playback Equipment

Magnetic Media

- Consists of a thin layer capable of recording a magnetic signal supported by a thicker film backing. The magnetic layer, or top coat, consists of a magnetic pigment suspended within a polymer binder..
- Magnetic tape will only last a few decades. Use of magnetic media for storage is further confounded by the prevalence of several formats, media types (iron oxide, chromium dioxide, barium ferrite, metal particulate, and metal evaporated), and by rapid advances in media technology.



What can go wrong with magnetic media?

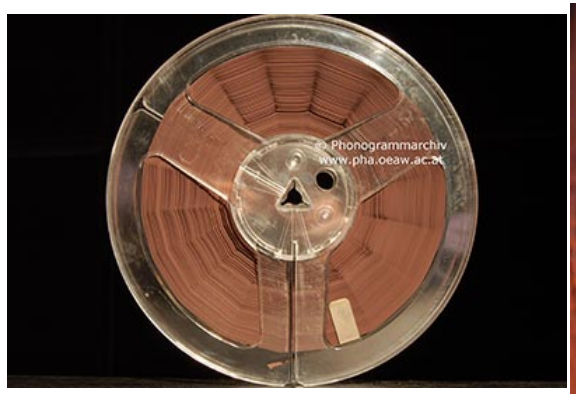
- **Binder degradation**
  - Causes: Poor storage conditions (high RH), natural aging
  - Indicators: “Sticky Shed Syndrome” (powder or gummy residue on tape surface, tape layers adhere, oxide flaking or shedding); strong smell of “dirty socks”
  - Affects polyester base tapes, especially 1/2” open-reel videotape

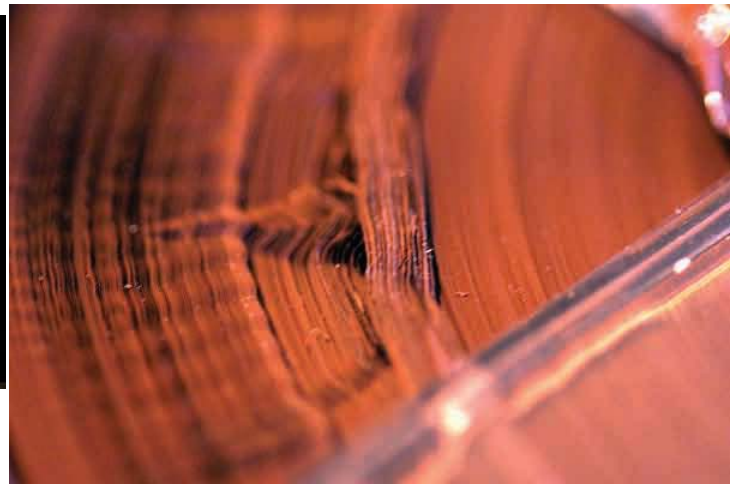
- **Acetate base deterioration**
  - Causes “Vinegar Syndrome” (acid hydrolysis)
  - Indicators: Strong vinegar smell (acetic acid), tape shrinkage or breakage, flaking binder layer
  - Most likely to occur in open-reel ¼” audiotapes
  - Contagious: Segregate affected tapes, store in cool, dry environment

What can go wrong with magnetic media? (2)

- **Tape Deformation / Tape pack issues**
  - Causes: Poor handling and storage conditions, poor tape wind, misaligned playback equipment
  - Indicators: Cinching, stretching, edge damage, spoking, etc…

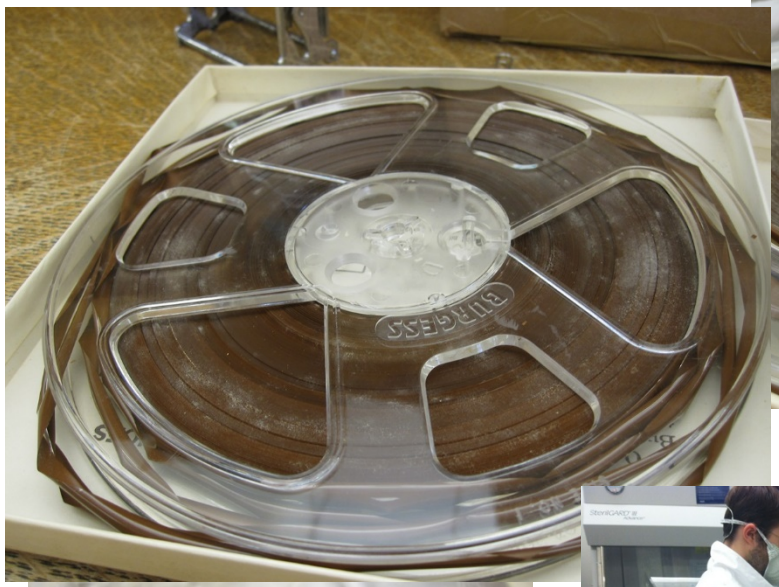
- **Degradation of magnetic particles**
  - Causes: Poor storage conditions (moisture and pollution), corrosion
  - Particularly affects early versions of MP and ME tapes (cracking or delamination of thin magnetic layer)
  - Very difficult to assess visually

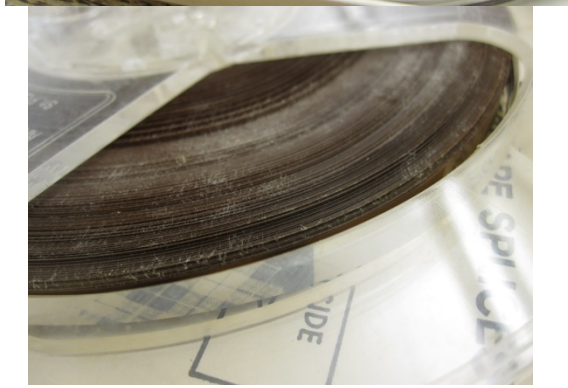




What can go wrong with magnetic media? (3)

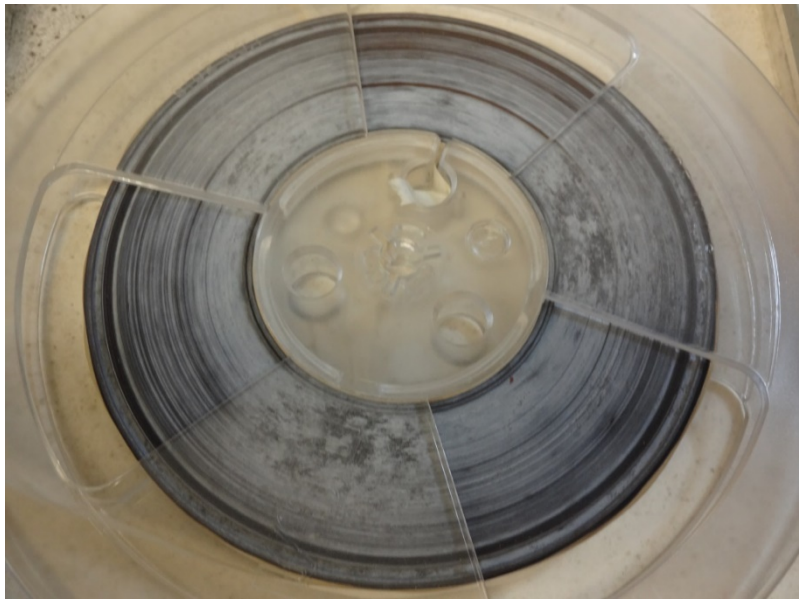
- **MOLD!!!!!**

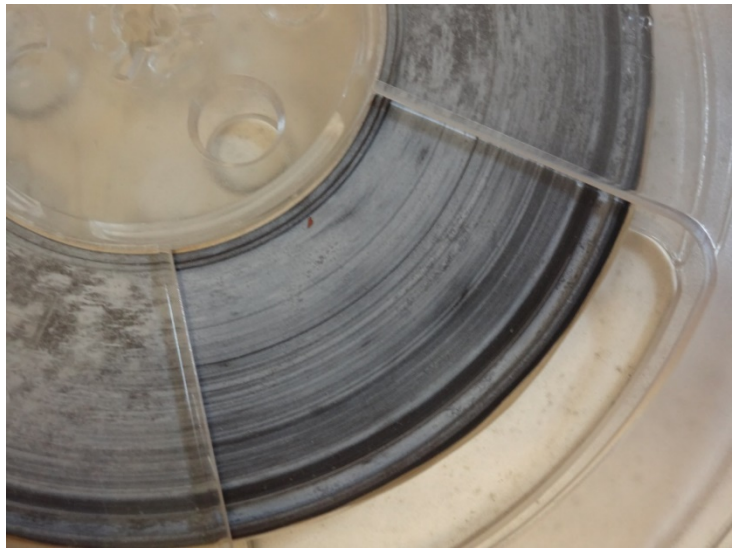


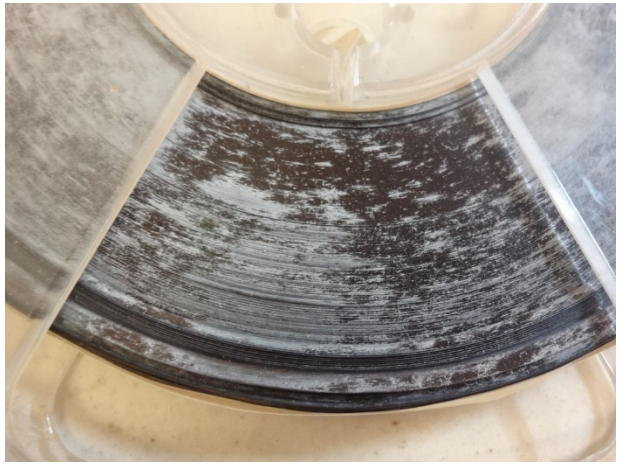


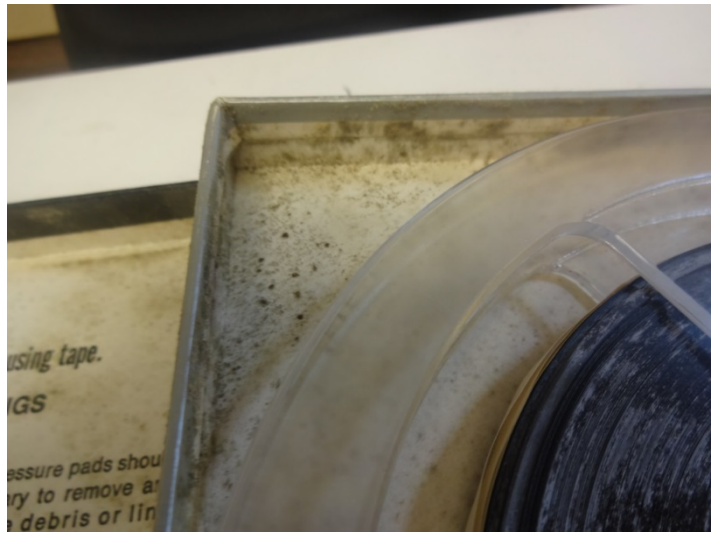
What can go wrong with magnetic media? (4)

- **Mold/Binder Hydrolysis/Lubricant Leaching/Pests**

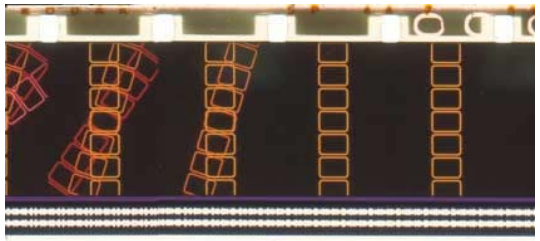


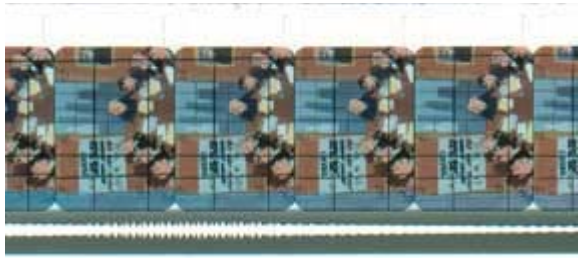


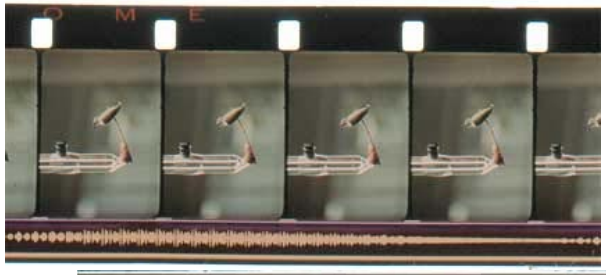




Film Formats



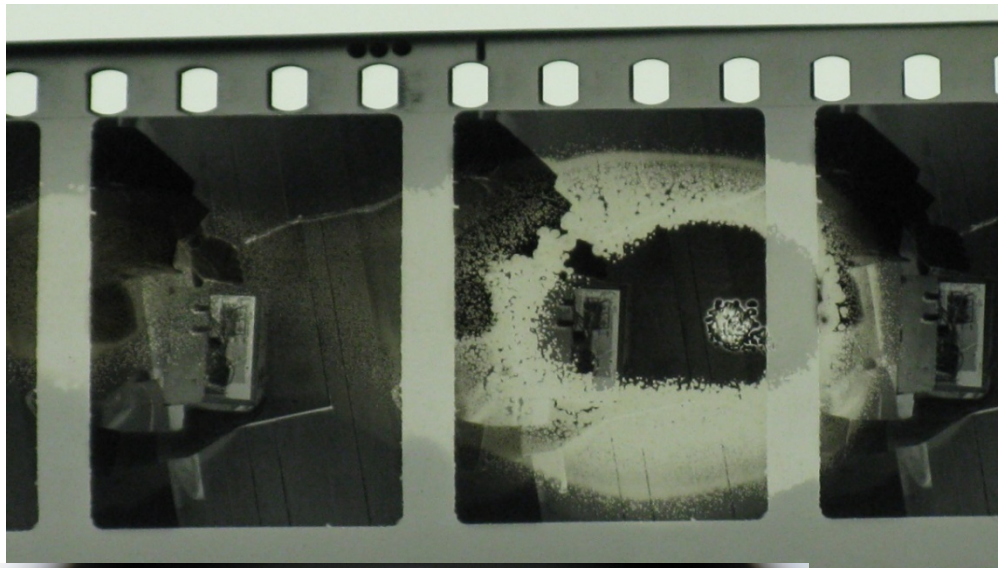


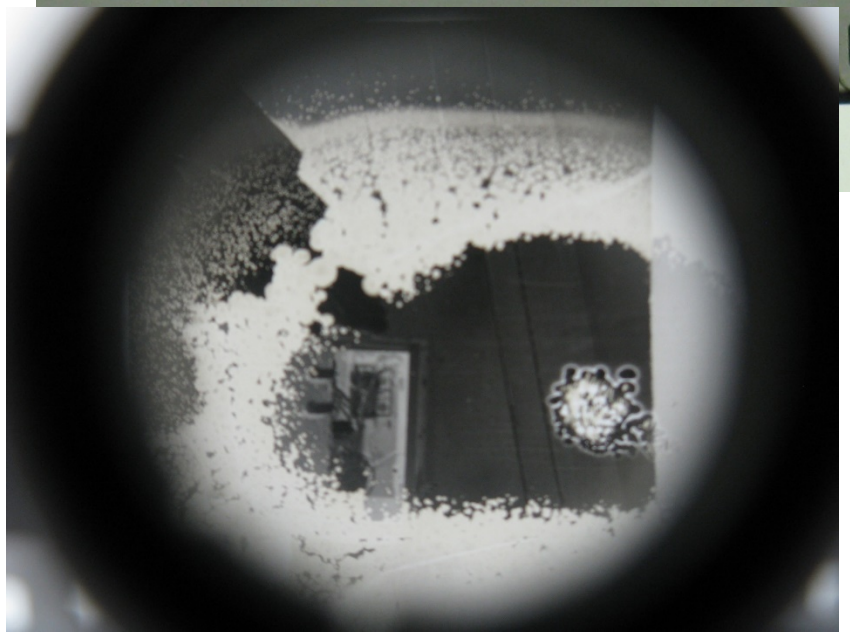


What can go wrong with film?

At most general level film is categorized by its base:

- **Nitrate**: Base made of cellulose nitrate. Used from 1880s through 1920s.
  - 5 stage chemical deterioration process:
    - Image fade>sticky emulsion (faint odor)>Emulsion softens and bubbles>Congealing into solid mass (strong odor)>Disintigration to brown powder
  - Due to chemical makeup of cellulose nitrate and storage conditions
  - Highly flammable





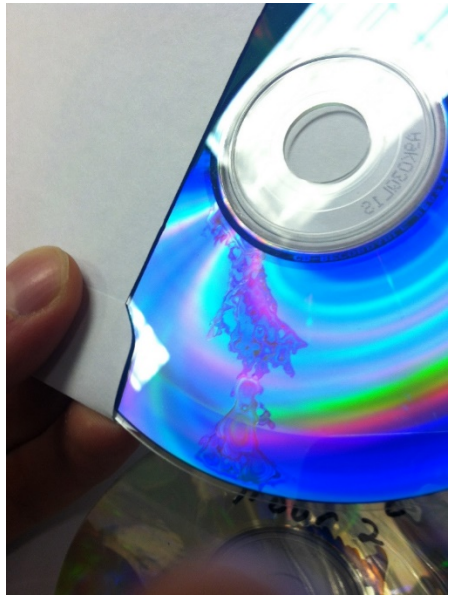
What can go wrong with film? (2)

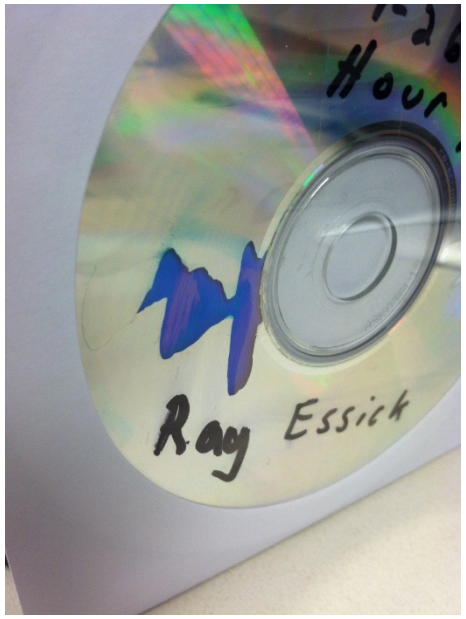
- **ACETATE**: Base made of Cellulose Acetate (mostly cellulose triacetate after late 1940s). Often known as “Safety Film.”
  - 5 stage decay process, often known as “vinegar syndrome,” due to H2O, high RH% and heat.
    - Vinegar Odor > Film Base Shrinkage (curling and warping) > Loss of flexibility > Emulsion cracking and flaking off > White powder appears along edges and surface.
  - Susceptible to mold

What can go wrong with film? (3)

- **POLYESTER**: Introduced in 1950s by Kodak. Very tough and chemically stable, difficult to break. Often thought to be too tough on film equipment!
  - Main issue: Color dye fading. Can occur in a very short time, sometimes just years. caused by the rapid fading of the cyan and yellow image dyes.

- **CD / DVD**





Digital???

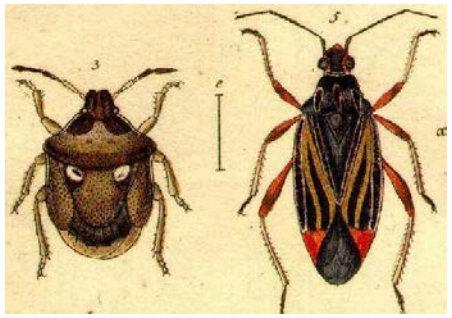
DIGITAL = ???????????????

Storage Issues

- Several factors affect the life expectancy of audio-visual assets:
  - Environmental Conditions – Temp and %RH
  - Storage Conditions – Clean v. dirty, dry v. damp, consistent v. variable temp, %RH

Storage Issues (Con't)

- What types of housing are individual items stored in?
- Other building/facilities factors:
  - Dirt
  - Leaks
  - Insects
  - Fungus
  - Plumbing
  - Etc…..



Ideal Storage Conditions

- General Rule: Cool and Low Humidity
- Recommendations:
  - Film: 32-54F, 30-50 %RH
  - CD / DVDs: 40-68 (Room Temp.) ‘F, 30-50 %RH
  - Magnetic Tape 40-54 ‘F, 30-50%RH

Storage Issues

Condition Assessment

- Assessing present condition can be tough for many reasons:
  - Physical condition of the asset
  - Ability to transfer/play a particular format.
  - How to accurately assess playback quality?
  - Previous Use?
  - Manufacturer's whims

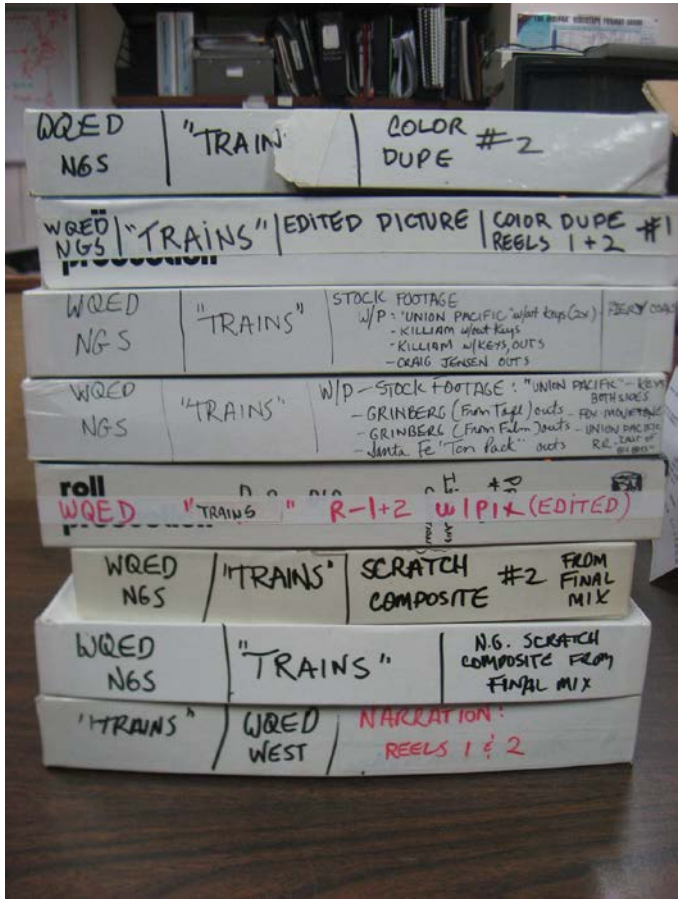
Playback Assessment

- For magnetic media need both visual assessment and playback assessment

- Playback Assessment can be a little more tricky:

http://avaa.bavc.org/artifactatlas/index.php/A/V_Artifact_Atlas

How is it Accessed?



How Do We Preserve This Stuff?

- Need a many faceted, flexible approach for both the SHORT TERM and LONG TERM
- Short Term(~5 yrs):
  - Collection surveys, content analysis and preservation assessments
  - Storage and maintenance of physical collections (triage if needed)
  - Develop standard policies and procedures
  - Develop plans for financial (internal or ex
  - Advocacy and outreach

How Do We Preserve This Stuff?

- Some easy things that can be done NOW:
  - Re-housing: Video, audio
  - Film: A/D Testing and Molecular Sieves
  - Minimize handling and train staff in proper handling procedures
  - As always: monitor the environment!

Preservation Through Migration

- Long Term (5-20 years**):
  - **Digitization** and Continued Maintenance of Physical Materials
  - A long-term, sustainable model for digital preservation (stewardship) and migration
  - In-house or Out of house (Vendor)??

How much time does it really take?

- Recently completed IL Campus Media Census
  - Located ~410,000 physical A/V items in 101 (17%) of UIUC campus units.
  - To digitize *ONLY* the unique/rare content (98,563 or ~25%)

- **15 Years** of 24/7 Digitization
- ALL 410,000+ =

  >85 YEARS

Prioritizing

- Common sense approach
  - Transfer most severely degraded materials first
  - Transfer most “at-risk” materials first
  - Transfer those items you will get the most benefit from
    - Complete series/programs
    - Most requested topics/programs

Common File Formats

- Uncompressed
  - QuickTime or AVI
- Compressed
  - DV-Quicktime
  - DV-AVI
  - MPEG 2 at high data rate
- Access
  - MPEG 4 (h.264) – has majority of market share
  - Flash – was once common…shrinking market share

Digital Challenges

- Technology is changing all the time
  - The codecs (encoder/decoder) and computer systems you use today won't be available in the future
- Digitizing requires on-going resources and cost
  - Not a "once and done" proposition
  - Even if you choose best option today, you will need to migrate in the future
- Good news: Cost of storage continues to drop

Copyright Challenges

- Purpose of copyright- To promote the creation of culture through:
  - Rewarding creators with limited monopoly
  - Encouraging new users to use existing culture
- Fair Use: Legal, unauthorized use of copyright materials, under *some circumstances*
- Section 108:

It is the opinion of the project that the U.S. Copyright Act, most specifically pursuant to §108(c) 2 as presently enacted, permits the reproduction reformatting libraries propose to undertake, subject to the guidelines

Fair Use: Section 108

- (c) the right of reproduction under this section [i.e., § 108] applies to three copies or phonorecords of a published work duplicated solely for the purpose of replacement of a copy or phonorecord that is damaged, deteriorating, lost or stolen, or if the existing format which the work is stored has become obsolete, if –
  - (1) the library or archives has, after a reasonable effort, determined that an unused replacement cannot be obtained at a fair price; and
  - (2) any such copy or phonorecord that is reproduced in digital format is not made available to the public in that format outside the premises of the library or archives in lawful possession of such copy.

Fair Use: Section 108

- *For purposes of this subsection, a format shall be considered obsolete if the machine or device necessary to render perceptible a work stored in that format is no longer manufactured or is no longer reasonably available in the commercial marketplace.*

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Link to UIUC Campus Media Census:
https://www.ideals.illinois.edu/handle/2142/50106