

# **Endangered Archives Programme**

## **Guidelines for video preservation**

Video and audio collections have similar preservation issues, namely preservation of the carrier itself, and preservation and maintenance of the means of playback. Whilst audio preservation has gradually evolved some base standards from which to build a framework for preservation, video is still in a state of flux, due to the complexity of the signal, various different worldwide standards, and the still-changing nature of digital technology.

### **Preservation and Conservation**

Preserving video recordings involves first deciding on a suitable destination format – digital tape or file-based. The format must be able to support the video standard in question – PAL, NTSC or SECAM, standard definition or 720/1080 high definition, as it is very important not to introduce any conversion artifacts at this stage. The connection from player to recorder must also allow for the best possible signal format, be it composite, S-video, component or SDI digital. The player must be set up and calibrated as well as is possible, given current technologies. Any problems in the recording, such as mis-tracking, skew etc, need to be compensated for as far as is possible. Sometimes this may involve mechanically or electrically mis-aligning a machine in order to extract the best possible signal from the tape, for the video and however many audio tracks may exist. It is important to verify the audio track configuration on the tape (longitudinal, hi-fi, digital, etc) and use the correct player for this. Where more than two tracks exist, this may also inform the destination format decision.

In choosing a recording format for preservation, the two major considerations are the quality of the signal (picture and sound) and the likely continuing availability of playback equipment. From these criteria, it is possible to select some main contenders. The choice is basically between file-based storage on hard drives, transfer to another, more recent videotape format, and transfer to optical disk – DVD-Video, in that order of preference.

### **Digital File-based archiving**

Migration from videotape to digital file-based storage, as with audio, has become the best option for preservation. Uncompressed video is the best quality available and means that very little of the original image is lost in the conversion to digital. At a later stage, the image can be converted to other formats, manipulated in post production and cleaned up in various ways, all at the highest possible quality. It is quite likely that further migration or translation of the video may need to be carried out for future preservation, and keeping the signal uncompressed ensures maximum quality. A system enabling uncompressed capture and storage as uncompressed AVI or Quicktime should always be the first aim. In its raw, uncompressed state, 50 seconds of video and audio will use approximately 1GB of storage.

However, although storage costs continue to fall, the data management and continuous migration needed for a large video collection is still a formidable task. Video compression may be used with care, in circumstances where uncompressed capture is not feasible. MPEG is a very efficient form of compression, used in many areas, although there are literally hundreds of different compression formats (codecs)

available and choosing the right one is difficult, with obsolescence almost guaranteed. Picture quality can deteriorate when compressed files are transferred at some point in the future.

The archiving community therefore approaches compression very carefully, in the hope of choosing a format in which to store the video signal which will not need to be changed in the foreseeable future. One possibility is JPEG2000 compression with MXF file format, which can be 'lossless', avoiding the problems of MPEG, with several other advantages. However, there are still very few manufacturers providing only expensive equipment supporting the format.

## **Born Digital Archiving**

Assets which only exist now in a digital form, such as VCD, DVD-Video, Quicktime or other video file formats on CD, DVD or other older disk formats need transferring in their native state to some more stable data format. The files should not be altered in any way but should be copied to another medium, such as hard drive or data tape. Very often, however, material may have arrived at this format via a tape-based camera, or tape-based production master, and wherever possible these should be sought out and preserved, as well as the file-based assets.

## **Digital Betacam**

'Digibeta' is still the archive format of choice for many video and film archives. Although the machines are expensive, at around £16,000, they are very robust and also very common throughout the broadcast industry, so spares and support for playback should be available for some time to come. However, suitable recording machines are beginning to become scarce, as broadcasters and Sony phase out the format. In addition, special options are needed in order to record from older analogue formats, such as VHS. First generation recording machines are no longer manufactured, but Sony has designed all their formats for the past 20 years around the same cassette profile, so many newer format machines are also able to play back Digital Betacam tapes.

## **DV / DVCAM / DVCPRO**

The consumer DV format was the most widely available affordable digital video format. Higher quality variants, DVCAM and DVCPRO were provided by Sony and Panasonic respectively. All three systems have the same compression ratio, 5:1, but the higher relative tape speeds of the latter two make them more suitable for archiving. If a linear tape format with light compression is preferred to other file-based formats, DV is a useful option, and equipment can be found relatively cheaply now. Various hardware and software is also available for converting tape-based picture and sound to other file-based formats when required, often for free.

## **DVD-Video**

DVD-Video is the cheapest but lowest quality format. It is very widely accepted and is likely to be supported for some time into the future, with both software and hardware players. Based on the 4.7GB optical DVD disk, the system uses a tightly controlled format specified by the DVD Forum (<http://www.dvdforum.org>). The pictures are heavily compressed, usually in MPEG2, and audio should be uncompressed

preferably, or Dolby Digital compressed. Recorders are readily available, as are blank optical media, though the quality of these must be rigorously controlled to maximise the interchange capabilities and shelf life of the disks. However, optical media must still be regarded as one of the least stable of the available carriers, and multiple copies should be made on different stock, in an effort to forestall future playback problems. A very low-cost (and quality) option for transferring VHS video is to use a single machine with VHS player and DVD recorder built-in.

The DVD recording setup must be done carefully, using the highest available data rate and uncompressed audio. This will give a maximum recording time on the 4.7GB disk of approximately one hour.

## **Summary of possible archive formats**

### **File-based archiving**

#### Advantages

- Once-and-for-all transfer possible.
- Very high quality (losslessly compressed) images and sound are possible.
- Metadata standards are being developed to allow sophisticated cataloguing.

#### Disadvantages

- Standards are still in flux.
- Most expensive solution.
- Very little equipment as yet available.
- High skill levels required to deal with.
- Active data storage and migration policies must be developed and operated, at some cost.
- Compression lowers the quality and risks making the file obsolete sooner

### **Digital Betacam**

#### Advantages

- Abundance of and support for playback equipment.
- Least compressed of the common video formats.
- Four 20-bit audio tracks available for transfer of longitudinal and HiFi audio tracks if required.
- Common worldwide archiving format.
- Worldwide solution likely to become available for migration.

#### Disadvantages

- Relatively expensive.
- Tape storage conditions are critical for longevity.
- Migration to file-based formats will still be required before the format becomes obsolete.

## **DV / DVCAM / DVCPRO**

### Advantages

- Cheap, well-proven tape-based format.
- Relatively light 5:1 video compression and no audio compression.
- Abundance of equipment to transfer tapes digitally to file-based formats or DVD-Video.

### Disadvantages

- 'Professional' upgrades – DVCAM and DVCPRO are single manufacturer-based.
- Tape storage conditions are critical for longevity.
- Migration to file-based formats will still be required before the format becomes obsolete.

## **DVD-Video**

### Advantages

- Cheap.
- Reasonable picture quality.
- Good compatibility.
- Widely available low-cost equipment.

### Disadvantages

- Optical media has many quality problems and uncertain shelf life.
- Video and usually also audio is compressed.
- MPEG compression is problematic.
- Quality thus lost is never subsequently recoverable.
- Semi-professional, rather than domestic recorders are preferable for archiving, which are not so plentiful.

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