

Case Study 1: Technical Standards for Audio and Video Digitisation | July 2010

This document summarises the information which informed the decisions on technical standards for digitising audio and video.

Audio

File formats: .WAV is accepted as the standard, used both in the professional audio industry and the archive sector, as a master archive wrapper. It is recommended by the IASA (International Association of Sounds and Audiovisual Archives). .BWF is an extended version of .WAV with the facility for simple embedded metadata. As LIFE-SHARE used complex metadata stored externally, there was no need for this extra functionality - .WAV is the most suitable format for the Case Study 1.

(There are other file formats which fulfilled most of our requirements, but these are not suitable as technical standards for this project because they are not easily read by all audio software programmes. FLAC would be an example of this – it offers lossless compression but won't work with most programmes. These file formats would therefore need to be converted in order to be used, which is cumbersome, time-consuming, and possibly even destabilising for the file.)

Master archive files should be an uncompressed copy of the original. The goal is to create as true and 'transparent' impression of the original as possible - rather than the 'best' sound possible; restoration or mastering to improve the audio fidelity *should not be undertaken on the master archive file*, but on a optimised copy. Optimising (which can include normalisation, compression, filtering etc) is a process which should be documented and that documentation saved with the file (in effect, more metadata) – Audacity, which we used for LIFE-SHARE, saves the settings of optimisation in the project file (.aup).

Distribution files may be better in MP3 format, because audio fidelity is not as important as with the master copy, and MP3 uses ID3 tags which contain embedded information (ie metadata). This is important for the user playing the recording – it is what informs an iPod, for example, of the name of the track, artist, year and so on.

Codecs and Wrappers are distinct but related aspects of digital audio. The most common codec is Linear Pulse Code Modulation (LPCM) which is lossless – used in .WAV, .AIFF and .BWF wrappers. MP3 is a lossy codec, which is why it is inferior and should not be used for preservation – it reduces the complexity of the audio waveform to reduce file-size. It is worth noting that the driver for this is that the **storage of digital files** can take up a lot of space, depending on sample-rate and bit depth. It is important to take into account storage when choosing the quality of digitisation (i.e. preservation begins with creation, again).

High sample-rate and high bit-depth are advised for top quality audio masters – but not necessary if the state of the source material means getting good audio fidelity is out of the question anyway. In those circumstances you may as well save storage space and use lower rates and depths.

Spoken word recordings, such as those involved with Case Study 1, have a smaller frequency bandwidth than most musical or other types of recordings. So although the master archive should still be recorded to

the highest quality possible, a greater level of compression can be used for distribution copies without adversely affecting the sound.

Ambient Noise can be very important to a recording if it relates to oral history or cultural heritage materials. Historians may thank us for leaving ambient and environmental noise in rather than 'optimising' it out to better hear the words being spoken.

Web hosting has different slightly different requirements if the files are to be streamed, rather than downloaded. The two most common are Real Audio and Windows Media Audio, both of which are very low quality. Compression is recommended due to the huge amounts of space needed for uncompressed audio, particularly if the files are to be practicably downloaded by users.

Conclusions and Summary for LIFE-SHARE

For the purposes of Case Study 1 we aimed to do the following:

- **Create a Master Archive file** by digitising the reel-to-reel at the highest bit-depth and sample-rate possible, to .WAV format
- **Create an optimised distribution file** by compressing and if necessary normalising or otherwise cleaning up the Master version, converting to MP3 format, and adding basic embedded metadata
- **Create a compressed file for web-hosting** – Sheffield intend to offer the items online at some point, so it makes sense to create all necessary versions at the same time. Create a Real Audio file for streaming, using Audacity.

File Size Examples

To take an example of a digital object created by LIFE-SHARE as part of this case study, and compare the file sizes of the different formats - 29 minutes of audio (traditional singing) produced the following: 23kb Audacity project file, 27mg distribution MP3, 152mg WAVE archive master file.

Video

Here is some more information on technical standards with regards to digitising video.

File format is more limited by the soft- and hard-ware used to capture the video, than is the case with digitising audio. You may have to use a single proprietary format associated with the manufacturer of the capture hardware. Mid-range systems can generally use .avi or .mov; high-end systems can use JPEG2000 format in an MXF (Media Exchange Format) wrapper. This is an open format, capable of lossless compression, but is *not a widely adopted format*. Many experts recommend MPEG-2, .avi or .mov.

Archive preservation file formats are a tricky area, with not as much consensus in the archiving community than there is about audio formats. The technology is less proven in this area. So in practice, many archives use proprietary formats which are lossless and relatively proven (and whose software is freely available) even though they are not open formats and could in future become obsolete, leading to a short-term solution. (To guard against obsolescence, the codec package is archived along with the files themselves, although there can be copyright difficulties associated with this.) As above with the audio master, the goal is to preserve the video as it is, rather than improve it.

Codecs and Wrappers are distinct but related aspects of digital video just as they are of audio. Common codecs are MPEG-4 ASP and Sorenson; common wrappers are .avi (Audio Video Interleave), .wmv (Windows Media Video), and .mov (QuickTime).

Compression should not be lossy, as with audio. An uncompressed file should be the master copy; compressed versions using a lossy codec are suitable for distribution.