ARSC Guide to Audio Preservation

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ASSOCIATION FOR RECORDED SOUND COLLECTIONS | ARSC

Council on Library and Information Resources

National Recording Preservation Board
OF THE LIBRARY OF CONGRESS

ISBN 978-1-932326-50-5
CLIR Publication No. 164

Copublished by:

Association for Recorded Sound Collections
c/o Nathan Georgitis, Knight Library
1299 University of Oregon
Eugene, OR 97403
Website at http://arsc-audio.org

Council on Library and Information Resources
1707 L Street NW, Suite 650
Washington, DC 20036
Website at http://www.clir.org

The Library of Congress
101 Independence Avenue, SE
Washington, DC 20540
Website at http://www.loc.gov

Commissioned for and sponsored by the National Recording Preservation Board of the Library of Congress.

Publication inquiries should be directed to Kathlin Smith at the Council on Library and Information Resources (CLIR).

Additional copies are available for $30 each. Orders may be placed through CLIR's website at http://www.clir.org/pubs/reports/pub164.

The paper in this publication meets the minimum requirements of the American National Standard for Information Sciences—Permanence of Paper for Printed Library Materials ANSI Z39.48-1984.

Cover design: *Kim Smith*

Library of Congress Control Number: 2015940108

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CHAPTER 6

Preservation Reformatting

By William Chase

Carrier deterioration and technical obsolescence make reformatting to digital files the only way to ensure future access to legacy format sound recordings. This chapter covers best practices for target preservation formats and provides guidance on making the decision to reformat in-house or outsource, working with vendors, and obtaining funds for reformatting projects.

Preservation reformatting is the process of transferring the essence or intellectual content of an object to another medium. With audio collections, recorded sound content is transferred from one carrier to another without degradation or alteration of the original content. Done correctly, the transfer of analog or carrier-dependent digital audio formats to digital files should not introduce any signal degradation. Given the instability of all digital audio carriers, such as optical discs or Digital Audio Tape (DAT), uncompressed digital audio files are the preferred format for preservation.

A restored version of a sound recording cannot be considered a preservation copy.

A successful preservation transfer captures the essence of the audio as it is accurately reproduced from its carrier. Reformatting a sound recording without compromising the authenticity of its content requires the use of well maintained and properly aligned playback machines; the correct stylus or playback head; equalization and other decoding mechanisms, such as noise reduction, as needed; and high-quality analog-to-digital converters to record uncompressed digital audio.

Carrier restoration for optimal playback, such as disc cleaning or tape baking, is often a necessary step in preservation reformatting and may already be part of conservation efforts. However, subjectively removing imperfections or interpolating lost material in the recording to optimize its sound quality is *restoration*, not preservation, and should be undertaken only after a true preservation copy has been made. Restoration processes such as hum removal, de-clicking, and noise reduction are helpful

for improving the usability of unintelligible audio recordings, but these processes also compromise the authenticity of the audio. A restored version of a sound recording cannot be considered a preservation master.

6.1 CONVERSION TO DIGITAL FILES

A digital preservation master should be encoded and stored in an uncompressed file format for two reasons: first, data reduction through the use of "lossy" (i.e., compressed) codecs will result in an irreversible loss of audio data; and second, it is unknown whether the lossy information will be decodable in the future. Pulse code modulation (or linear PCM) is the recommended encoding stream for digitized audio and is generally the default encoding scheme for WAVE (Waveform Audio File Format) .wav files.

The Broadcast Wave Format (BWF) .wav file is the de facto standard for digital archival audio. Like standard WAVE files, BWF files keep the .wav file extension. It is nonproprietary, and because BWF is limited to two file types of audio data (linear PCM and MPEG), it is interoperable with a wide range of applications and operating systems.

Advice on the naming of files may be found in chapter 7.

FILE USES

Three files are typically produced in the preservation reformatting process: the preservation master, access (or production) master, and access copy (Table 6.1). The preservation master is a digital surrogate for the original recording and should accurately capture all information in the source. This requires accurate playback of the source and high-resolution digital capture.

The access master, derived from the preservation master file, is typically a lower resolution, uncompressed BWF file from which all access copies—physical and file-based—are derived. Compact disc (CD) resolution (44.1 kHz sampling rate with a bit depth of 16 bits per channel) is common for access masters, as it allows for easy duplication of CDs and compressed MP3 files. However, if access masters are intended for use in a production environment, or for research and analysis, they should be created at a higher resolution than CD specifications. An access master may also be "restored," that is, optimized for sound quality and intelligibility to benefit the user. Audio levels might be adjusted, and digital signal processing such as de-noising and de-clicking applied as needed.

The access copy is the final deliverable to the user. It is commonly in the form of a compressed file, such as an MP3, for online streaming or download. An access copy may also be in a physical format, such as a CD.

Access masters and all copies derived from them can be efficiently created through batch processing tools found in most digital audio editing software or with standalone applications. Recommended storage practices for each of these file types are discussed in chapter 7.

Preservation Master	Access Master	Access Copy
High-resolution, uncompressed BWF No signal processing No edits other than trimming the beginning and end of file; may contain only a segment of the original recording if there are format changes or problems during the transfer	BWF derived from preservation master; possibly lower resolution Signal processing allowed May be edited for content (e.g., remove long durations of silence; combine multiple files to create single intellectual unit; redact restricted information)	Physical copy or digital file derived from access master; may be compressed for online streaming

Table 6.1: Characteristics of preservation master, access master, and access copy

SAMPLING RATE AND BIT DEPTH

In general, the accepted specifications for audio digitized from analog sources are a sampling rate of 96 kHz and a bit depth of 24 bits per channel. The sampling rate sets the range of the frequency spectrum of audio captured during the digitization process. The International Association of Sound and Audiovisual Archives (IASA) recommends a minimum sampling rate of 48 kHz, yet some projects may benefit from a sampling rate higher than 96 kHz (IASA 2009). When the appropriate conversion specifications are unclear, it can be helpful to develop a familiarity with the content and intended use of the material. Digitizing at a higher sampling rate facilitates removal of unwanted artifacts for access copies in the digital domain and the capture of sounds outside the human hearing range needed for research purposes, such as wildlife sounds.

Digital originals, such as optical discs, DAT, or MiniDiscs, should be kept at their native sampling rate and bit depth. There is no benefit in audio quality to up-sampling a digital recording that is fixed at a lower resolution, and it results in excessively large files that waste storage space.

6.2 METADATA FOR REFORMATTING

> We can make the highest quality transfers, with the finest equipment available, but unless we record and maintain the requisite metadata, essentially all we have is a bunch of files with an uncertain past and an even less certain future. (Casey and Gordon 2007, 62)

A digitized collection should be framed by descriptive, administrative, and structural metadata. Descriptive metadata are discussed in chapter 5 of this guide. The focus in this chapter will be on administrative and structural metadata as they pertain to audio preservation: their role in the preservation process, ways they can be created, and where they can be stored. Understanding these concepts can inform decisions about metadata workflows for in-house digitization and facilitate communication with a vendor about metadata needs.

ADMINISTRATIVE METADATA

Included in the administrative metadata is information that assists in the management of a digital file, such as how it was created, its provenance, its technical specifications, and any access restrictions that may be associated with it.

Technical Metadata. Understanding the object to be preserved, whether it is a reel of tape or a digital file, is essential to ensure proper care in the near term and to inform future migration. Technical metadata describe specific attributes of an audio object. For a physical source object to be digitized, some of these attributes include the following:

- Material composition (layer types, track configuration)
- Dimensions (disc diameter, tape gauge, unwound tape length, shape)
- Audio signal characteristics (playback speed, equalization, sound field)
- Condition (soft binder syndrome, delamination, deformation, contamination)

Common digital audio file attributes include the following:

- Sampling rate
- Bit depth
- Number of channels
- Data encoding type
- Duration
- File size
- File type
- Checksum value

Some of these metadata can be captured and stored automatically, although documenting unique physical audio objects tends to be more labor-intensive. As a collection manager, it is important to consider how such metadata will be used in the ongoing preservation process of your collections:

- What do I need to know to play back and capture the audio content now?
- What will I need to know to migrate the audio content in the future?

The notes written on a tape box, sometimes years ago—speed, tracking configuration, equalization, mono, or stereo—take away much of the guesswork surrounding proper playback of a recording by describing its basic attributes. These notes may have supported research by fieldworkers or interoperability in a broadcast environment in the short term, but they also provide future users with some guidance on accessing the content. Documenting digital file attributes in the preservation process will serve the same purposes.

Schemas for documenting audio object technical metadata provide guidance in preserving this information so that the recording, regardless of format, is usable. PBCore and *AES57-2011: Audio Engineering Society*

standard for audio metadata – Audio object structures for preservation and restoration are two commonly used standards for describing technical attributes of audio objects. PBCore was developed by the public broadcasting community, but can be applied to audiovisual collections in any repository setting. It is based on the Dublin Core metadata element set and provides plenty of fields to sufficiently describe technical metadata. AES57-2011 is a vocabulary expressed as an XML schema designed specifically for the purpose of describing technical attributes of all audio formats. The schema is flexible in that there are few required elements: at a minimum one can simply indicate the format of an audio recording, or document detailed information about dimensions and material composition, digital file properties, playback and signal characteristics, or condition notes. Although AES57-2011 provides richer, more structured audio object metadata, it requires a thorough understanding of audio formats to use it effectively.

Technical metadata about digital audio files can be automatically extracted from the files and exported in a variety of formats including CSV or XML files using tools such as MediaInfo, BWF MetaEdit, or the PBCore Instantiationizer.

Digital Provenance. Sometimes called the process history, digital provenance describes the tools and processes used to create a digital file, the responsible entity, as well as when and where the process events occurred. Digital provenance metadata support both immediate workflow coordination and future auditing of digital surrogates. Examples of audio digitization events and tools are shown in Table 6.2.

Event	Tool
Playback of source recording	Playback machine and settings (speed, equalization, reproduction levels, outputs)
Digital conversion of source	Analog-to-digital converter and settings (sampling rate, bit depth, level trim, inputs)
Capture of digitized signal	Digital recorder and settings (sampling rate, bit depth)
Creation of derivative files	Software utilities and settings (sampling rate conversion, dither, other digital signal processing)

Table 6.2: Examples of audio digitization events and tools

The extent to which digital provenance metadata are captured will vary, depending on the scope of collection(s) to be digitized, digitization personnel, and equipment. The Library of Congress digiProvMD schema, though not widely used, is a useful template for recording process history.

Process history may also be annotated in other schemas, such as PBCore, or in a custom spreadsheet or database. The Audio Engineering Society has yet to publish its AES-X098C standard, which is an XML schema that captures every event, device, and configuration setting of the preservation process in minute detail. Basic digital provenance metadata may be embedded into a BWF file header (see Embedded Metadata, below).

Rights Management. Documenting the copyright status and any use restrictions in the preservation reformatting process will help collection managers and users make informed preservation and access decisions. Extra care should be taken to ensure that digitized recordings with restricted content are not disseminated in violation of copyright law or donor agreements. Rights information may be documented in descriptive metadata, a collection finding aid, or a Metadata Encoding Transmission Standard (METS) document; it may be embedded in the file header; or it may be noted in some combination of these.

STRUCTURAL METADATA

For digital audio files, structural metadata serve many purposes:

- Provide context for an audio file as part of a larger intellectual unit, e.g., Side B of LP "XYZ"
- Provide instructions for sequencing parts of a larger intellectual unit, e.g., the second of two audio files that make up the whole
- Allow users to navigate to points of interest within a single audio file or among multiple files, e.g., where individual songs begin and end within Side B
- Convey the relationships between master and derivative files, e.g., XYZ_B.mp3 is a derivative of XYZ_B.wav
- Convey the relationships between the audio and other related files, media, and metadata, e.g., XYZ_B_L.TIFF is the disc label of the B side of the LP

Types of structural metadata include the following:

- Directory structures and file names
- Project file exports, such as generic edit decision lists or AES31-3 Audio Decision Lists (Audio Engineering Society 2008)
- Track markers
- Time stamps
- METS document

A sound recording is often more than just one audio object. There may be multiple segments, associated notes, and images. METS not only supports the aggregation of metadata from one or more objects, but also expresses the relationships between objects. In addition, METS can be used as a wrapper for deposit into a digital repository or for dissemination.

EMBEDDED METADATA

Most simply, embedded metadata can be defined as metadata that are stored inside the same file, or container, that stores the essence to which the metadata refer. Chris Lacinak writes, "In many ways one can think of embedded metadata as the file-based domain's equivalent of labels, annotations, and written documentation stored inside of material housing, or even as 'in-program' annotations such as audio and video slates at the head of a recording" (Lacinak 2014, 1).

Every file format has distinct embedded metadata specifications and fields. For instance, the options for embedding metadata in WAVE files differ from those for embedding metadata in MP3 files (AudioVisual Preservation Solutions 2009; ID3). Embedded metadata are what enable the display of information, such as artist, album, and title in applications that play back audio files. The primary goal of embedding metadata for the purpose of preservation should be to identify the object when it is dissociated from its external metadata, identify the holding organization, identify the data source that holds information about the object, and identify the copyright status. The Federal Agencies Digitization Guidelines Initiative (FADGI) published guidelines that recommended the use of broadcast audio extension (BEXT) and list-info chunks, or data segments that comprise WAVE files, to store embedded metadata in files that result from the digitization process (Federal Agencies Audio-Visual Working Group 2012). Files that are acquired, rather than created through digitization, likely have existing embedded metadata that was generated by people, software, or hardware prior to acquisition. In the interest of maintaining the authenticity of the original object, these files should undergo a different process with regard to embedded metadata.

BWF File Header Fields. The BEXT chunk allows for embedding a rich set of important metadata fields in the BWF file header, including a unique source identifier (USID), description of file content, digital provenance, and time stamp for sequencing of files when necessary. Table 6.3 shows commonly used BEXT fields. The Federal Agencies Digitization Guidelines Initiative has published guidelines for embedding metadata in Broadcast WAVE files with additional usage examples.

BWF MetaEdit is an open source tool useful for embedding metadata in WAVE files. Some audio editing software also natively supports BWF metadata.[1] The European Broadcasting Union (2011) BWF specification provides further details on the use of the BEXT chunk. Ultimately, the use of these embedded metadata fields should most benefit the institution. For example, application of a metadata field need not follow European Broadcasting Union recommendations if the usage benefit to the institution outweighs any need for external interoperability (Figures 6.1 and 6.2).

Resource Interchange File Format (RIFF) INFO Chunk Fields. In addition to the BEXT chunk, the RIFF WAVE header provides an INFO chunk, which allows further opportunities for embedding descriptive and technical metadata, such as title (INAM), performer (IART), location (IARL), or copyright metadata (ICOP). (See Figure 6.3.) FADGI recommends the use of the IARL archival location field to repeat the value stored in the Originator field in the BEXT chunk, "which records the entity responsible for the creation, maintenance, [and] preservation" (Federal Agencies Audio-Visual Working Group 2012, 12). INFO chunk fields can be very useful for asset management, access, and discovery (Figure 6.4). Some applications can map INFO tags to ID3 tags in MP3 file access copies.

A discussion of preservation metadata and PREMIS appears in chapter 7.

[1] For a study on the support of embedded metadata in different audio recording software applications, see ARSC Technical Committee 2011.

BEXT Field	Explanation and Common Usage	Example Data
Description	Free text field (256 character limit) to store identifier information about the audio, such as title, file name and use, URL, or URI.	Friday performances at the 1993 Florida Folk Festival (Main Stage) (Tape 6)
Originator	Free text field (32 character limit) to indicate the creator of the digital audio file, usually the name of the institution or specific entity within the institution.	US, NPR/UMD
Originator Reference	Unique identifier that may be supplied by the institution or generated by a digital audio recorder or software.	USSDV4703051160151037000083048O1 Unique identifier generated by digital recorder
Origination Date	Date, in YYYY-MM-DD format, on which the digital file was created (a useful component of the file's provenance)	2015-01-01
Time Reference and Time Reference (Translated)	Time code in sample count. If the file is part of a multipart sequence, the Time Reference field should reflect its exact position in the sequence of audio files.	321332734 Time Reference value expressed in number of samples 00:27:53.607 Time Reference (Translated) value expressed in hours, minutes, seconds
Coding History	Signal chain from which the digital file was created, starting with the analog or digital source. There are six elements that can be included in the coding history: 1. A = coding algorithm (analog, PCM, etc.) 2. F = sampling frequency in Hz 3. B = bit rate (for MPEG only) 4. W = word length or bit depth 5. M = mode or sound field (mono, stereo) 6. T = free text to describe playback and capture equipment	Example syntax: A = [analog, PCM for digital], M = [mono or stereo], T = [playback or capture device; parameters; format information] A = ANALOGUE, M = stereo, T = Studer A810; SN6083; 7.5 ips; open reel tape A = PCM, F = 96000, W = 24, M = stereo, T = Lynx Hilo; SN3112122134; A/D The first line shows that a stereo open reel tape was played back on a Studer A810 with a serial number of 6083 at 7.5 inches per second. The second line shows that the audio was digitized to PCM at 96 kHz sampling rate and bit depth of 24 bits using a Lynx Hilo analog-to-digital converter with a serial number of 3112122134.

Table 6.3: Commonly used BEXT fields

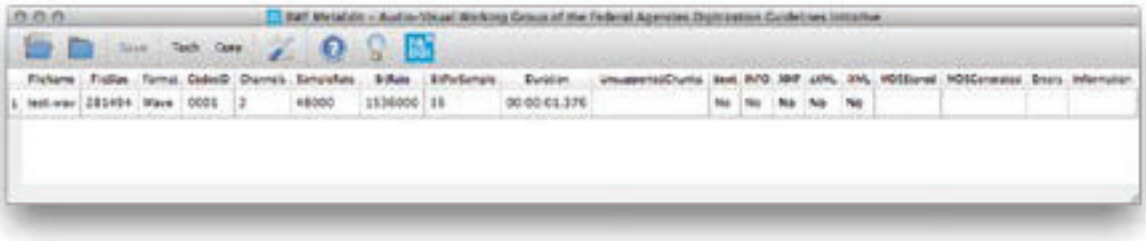

Fig. 6.1: BWF MetaEdit technical metadata fields

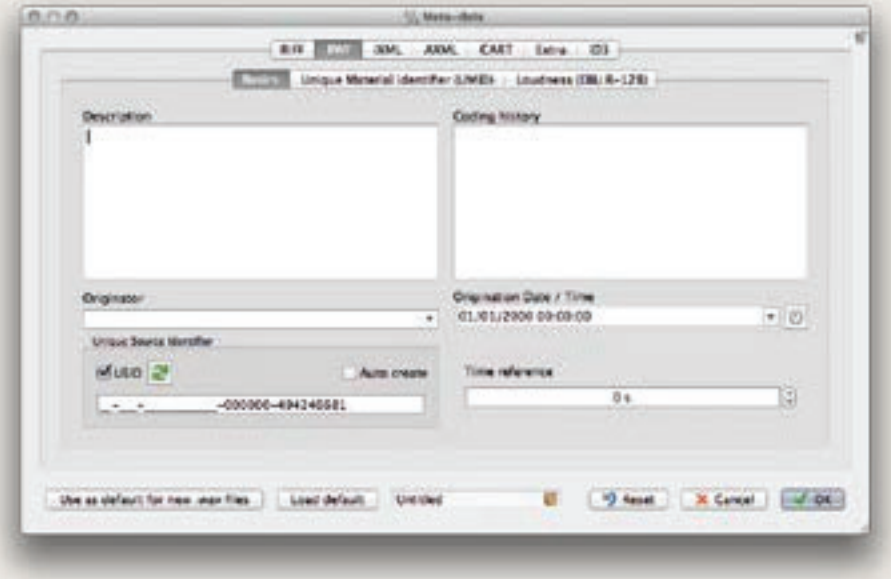

Fig. 6.2: BWF input screen in WaveLab

Fig. 6.3: BWF MetaEdit INFO fields

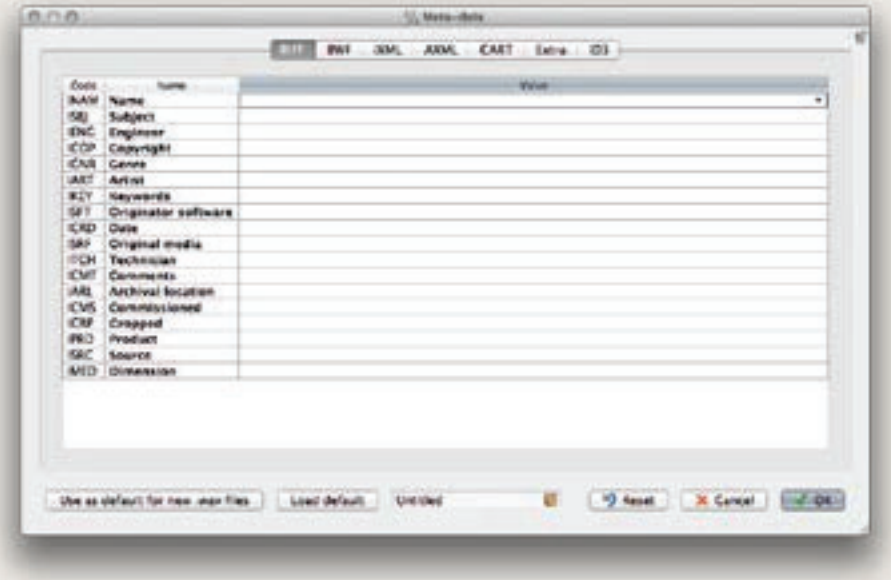

Fig. 6.4: RIFF INFO chunk input screen in WaveLab

6.3 DIGITIZATION: IN-HOUSE AND VENDOR OUTSOURCING

Once the materials to be digitized have been identified, your digital reformatting project is defined by its purpose and scope. Are you digitizing only for preservation, or will the project provide wide access to the material? Will the digitized audio need to be restored for intelligibility?

Before any digitization takes place, the items should be inventoried and reasonably described if they have not been already. Formats should be identified, and conservation issues noted. When you know how much of each format is in the collection, you can decide whether it is feasible to digitize in-house. If the collection is continually growing or the same few formats are regularly accessed, purchasing playback equipment may be justified for access and description as well as reformatting. The IASA 2009 guidelines and Casey and Gordon 2007 offer in-depth guidance and technical details about the necessary capabilities of an internal audio preservation infrastructure.

A project timeline is essential to meet budgetary, access, or other project deadlines. It is also important to define the project scope for both in-house and outsourced projects to ensure that the right personnel, equipment, and time are available when needed.

CONSIDERATIONS FOR IN-HOUSE DIGITIZATION

The availability of personnel, equipment, facilities, time, and funding are all critical in deciding whether to digitize recorded sound collections in-house.

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Personnel. Preservation reformatting of audio material requires specialized skill sets in multiple fields that are not commonly found in many institutions. First, audio engineers with a knowledge of both legacy recording formats and their corresponding playback equipment, as well as the principles of digital audio, should be available to oversee the transfers. This expert supervision is a measure of quality assurance to ensure that the content of the recording will be properly preserved without the risks of improper handling that may cause unnecessary damage to the original carrier.

Second, it is helpful if an audio engineer, sometimes in collaboration with an electrical engineer, is available to see that equipment is properly installed and maintained. Equipment that is not properly installed and calibrated will lead to degradation in playback quality and may cause damage to original recordings. In addition, equipment must be well maintained over time; technicians may be needed not only to perform basic cleaning and alignment, but also to replace parts and to carry out advanced refurbishing with specialized tools and test equipment.

Finally, collaboration with your institution's information technology (IT) department will ensure successful maintenance of digitized content for the long term. IT personnel will be able to help estimate file storage needs and costs, allocate the appropriate storage systems, and

implement a digital repository or asset management system if one is not in place already.

Equipment. Depending on the collections to be digitized, a wide range of equipment may be required. Most audio collections contain at least two or three formats, and in-house digitization requires the correct playback equipment for each format. In some cases, collections are accessioned along with playback equipment, which can be a huge benefit for formats such as DAT that are best reproduced on the machine on which they were recorded. By conducting a comprehensive survey of all audio holdings to be digitized, the collection manager can ensure that all proper playback equipment, converters, software, supplies, and maintenance items are available for the project to be successful.

In general, only modern, professional playback machines and converters should be used for preservation reformatting. Although this handbook is not meant to be a purchasing guide for audio equipment, there are a few basic qualities of professional-grade gear:

- *Transparency*: The source recording will be reproduced without any added noise, distortion, or other artifacts from the converter and playback machine.
- *Durability*: It is built to last; most playback equipment that will be used for legacy formats such as open reel tape is 30–40 years old already.
- *Reliability*: The likelihood of the component working below specification or completely failing is less than that of consumer audio products.

More detailed guidelines have been published in IASA-TC04 (IASA 2009); they address exact technical specifications necessary when building an audio digitization system.[2] All equipment should be fully tested and calibrated before being used to play unique archival recordings.

In addition to playback equipment and converters, supplies and accessories are required. Examples of these include splicing tape, leader tape, razors, a splicing block, cotton swabs, isopropyl alcohol, and a head degausser for open reel tape; spare cassette shells for rehousing damaged cassettes; and a variety of styli and disc-cleaning brushes and solutions for grooved discs. Some of these items present ongoing costs.

Facilities. The space available for audio transfer work is an important consideration for in-house digitization. Ideally, the space will be at least somewhat acoustically isolated so that the engineer can conduct his or her work without disturbing others, while also having the ability to listen critically when needed.

Time. Reformatting audio recordings often takes approximately three times as long as the run time of the recording. That is to say, a recording

[2] The Federal Agencies Digitization Guidelines Initiative (FADGI) A/V Working Group outlines different acceptable performance levels for audio digitization systems at http://www.digitizationguidelines.gov/guidelines/digitize-audioperf.html, and IASA 2009, chapter 2, outlines very specific technical specifications for analog-to-digital converters at http://www.iasa-web.org/tc04/key-digital-principles.

that is one hour in duration will take approximately three hours to digitize. The tasks that must be accomplished in those three hours include audio object inspection, alignment of playback equipment, signal extraction, and post-processing tasks, such as quality control, embedding of metadata, checksum calculation, and ingest into long-term storage. However, good workflow development can reduce time spent on reformatting processes. Throughput of signal capture can be increased through parallel transfer workflows, and post-digitization processes can be automated through scripting.

Funding. Developing an in-house audio digitization program involves much more than a one-time startup cost. You must plan for continual staffing, equipment maintenance, and supplies, as well as the ongoing storage, management, and potential migration of digital files and metadata. Although a grant may support some initial startup costs, it is necessary to budget for ongoing costs internally.

OUTSOURCING AUDIO DIGITIZATION

In many cases, it will be more cost-effective to outsource your collection to a digitization vendor. The learning curve for selecting a vendor is less complex than that for designing and building an in-house digitization program, but selecting the right vendor for your project still requires research.

Selecting a Vendor. Word of mouth from other institutions and private collection owners is a good place to start. All qualified vendors provide references from previous clients that you can contact.

The learning curve for selecting a vendor is less complex than that for designing and building an in-house digitization program, but selecting the right vendor for your project still requires research.

When reviewing vendor options, you will need to identify who will be transferring your audio assets; what their qualifications are; and what playback equipment, converters, and other treatments they will use. Many vendors make this information readily available online or in other informational literature. In addition to reviewing personnel and equipment, you should make sure that the vendor's facilities have the space and proper shelving to accommodate your collection. Storage facilities should be clean, secure, and climate-controlled, and a disaster preparedness plan should be in place.

Writing a Vendor Request for Proposal (RFP). While most vendors will work with you to develop project specifications, it is helpful to know what to expect. The client should include in the RFP submitted to vendors a project vocabulary, a project scope, and technical specifications. In addition, the client should provide the vendor with some history and context for the collection: the content type (e.g., music, spoken word, broadcast, field recordings), any known preservation issues, and recording format varieties and quantities.

In the statement of work included in the RFP, you must clearly define the purpose of the digitization project, whether it is for preservation, access, use in production or exhibition, or some combination of these. The purpose of the project will determine the types of digital files that are produced and their associated metadata. Also included within a statement of

work is how and when the vendor will complete tasks during each phase of the project, from shipping of originals to return of the final deliverables. A model for an RFP for audio preservation can be found at Lacinak 2015.

Another factor to be considered in selecting a vendor is the estimated time for project completion. Some vendors may have a large backlog of work and will not be able to complete your project when you need it. Including a timeline in your RFP will help you select the right vendor to meet your needs and set realistic expectations for the project. An RFP timeline may include dates for the following:

- Bidder questions and client responses
- Proposal submission
- Award of contract
- Shipment of materials to vendor
- Submission of files to client
- Review of files and metadata by client
- Final project completion

Some technical specifications for audio reformatting include the following:

- Definitions of master and service copies
- Target file types for masters and derivatives
- Sampling rates and bit depths for audio files
- Directory structures, file names, and persistent identifiers
- Embedded metadata

Developing Project Specifications and Communication. Good communication and clear expectations of the project deliverables, starting with a well-defined statement of work, make for successful relationships with vendors. Before a project gets under way, you must establish appropriate communication channels and a point or points of contact within your institution. Establishing clear expectations for when and how communication should occur and adhering to those expectations will ensure that the project is completed on time and according to specifications. Typically, client and vendor communicate

- On the vendor's receipt of shipments from the client
- Prior to the vendor's shipping deliverables
- At predetermined intervals for regular project updates

Managing Quality Control and Rework. In an ideal scenario, all digital files and metadata arrive from the vendor properly named and with no ambiguity concerning the quality of the transfer work. Although reputable vendors have multiple quality control and quality assurance measures in place, you will need in-house metrics to verify that the job was done correctly. A familiarity with the collection, including durations, content, and overall fidelity of the source material will help you determine if the digital files are complete, named correctly, and transferred properly. Do not hesitate to ask questions or request that items be re-transferred if necessary.

Furthermore, the original media should also be reviewed. The vendor should provide documentation regarding both the restoration of the carrier used in the transfer process and any damage that may have occurred.

If the vendor completes the project satisfactorily, contracting the same vendor for future projects can strengthen quality assurance over time.

Controlling Costs. Whether done in-house or with an external service provider, digitizing audio is costly, and many collection holders are operating on a limited budget. Fortunately, there are ways to reduce costs while improving efficiency when working with a vendor. Many vendors offer discounts for high-volume projects. Once you know the minimum qualifications for a discount, start by identifying large quantities of single formats within your collections. It may be more cost-effective to expand your scope of items to be digitized, but a volume discount will not be worthwhile if the collections to be digitized are not of high value and your institution cannot support the long-term preservation and access responsibilities of the resulting digital assets.

There are ways to reduce costs while improving efficiency when working with a vendor.

Another option for obtaining a quantity discount is to collaborate with other institutions and combine collections under one vendor contract. For example, the cost-per-item for preserving a group of 200 audiocassettes, all with the same metadata requirements, will be significantly less than the cost-per-item for 20 cassettes. Collection managers should be encouraged to create partnerships with other institutions that hold like formats. If your institution is a member of LYRASIS, consider participation in its Digitization Collaborative.

Finally, completing any collection description, inventory, and carrier restoration in-house will reduce the amount of work the vendor must do and potentially save many hours billed to your organization. Providing as much metadata as possible about the collection is a good starting point; at the very least, it leads to more accurate cost estimates. Technical metadata, such as playback speed, equalization type, and tracking configuration, reduce the amount of guesswork by transfer engineers. Providing this information in a format compatible with that of your vendor will reduce the amount of data "housekeeping" required of your vendor and help control the cost of the preservation service. Similarly, historical documentation about the recordings, such as the type of equipment they were recorded on or their recording location, can help vendors make important judgments about the playback of the original and understand any anomalies that may be present in the source recordings. Collection inventories also aid the collection manager in making judgments on how to most effectively establish priorities and ship the items to be digitized. It will be cheaper to bundle like media together than to send collections of mixed formats separately. Chapter 5 offers recommendations on creating inventories for audio collections.

6.4 FUNDING FOR PRESERVATION INITIATIVES

Audio digitization often supports the mission of the holding institution, so requesting funds internally can be justified. Making the business case for audio preservation involves gathering support from a variety of stakeholders, including the upper level of administration. Creating user stories about the value of your recorded sound collections is an effective method for explaining the return on investment for preservation activities. Use cases should illustrate benefits to the institution:

- Research value, uniqueness, and user demand for the content
- Relevance to the institution's larger mission, goals, and vision
- How digitization will raise the institution's profile
- Cost of inaction if the collection is not digitized[3]

Much audio preservation reformatting work is funded by grants and donations. Grants are available from local, national, and international

[3] AVPreserve has developed an online "Cost of Inaction" tool that illustrates how preservation efforts will become more expensive over time. Available at https://coi.avpreserve.com/.

Building Your Constituency

Users of your recorded sound collections should be your supporters as well as your patrons. They can become your advocates and your publicists, informing other scholars of the riches in your collection and attesting to the value of your resources to your administrators. Recent years have witnessed a significant growth of scholarly interest in sound recordings among serious researchers, both as subjects themselves, notably in the emerging fields of sound studies and media studies, and as tools serving the study of political and cultural history, literature, historical music performance practice, folklife, and more. Managers of recorded sound collections should be aware of general trends in scholarship that relate to audio and the specific interests of the researchers that use their collections. Responding to these trends and needs will encourage greater use of the collections and prove to potential funders that their support of activities to maintain and preserve the collections serves an ever growing number of beneficiaries.

If your library or archives is part of an educational institution, efforts should be made to inform faculty members of resources in your collection that are related to their field of study or teaching. University faculty members are often uninformed of unique special collections of potential value to their work. You may find that your collections are of value to a faculty member or researcher in a way you never expected. For example, a linguist studying dialects might consult an oral history collection. Researchers might also be working in areas unknown to you and may present an unexpected but welcome acquisition opportunity. Keep in mind, too, that researchers as well as faculty members often welcome the opportunity to deliver lectures and develop public programs that relate to their work with your collections. Your relationships with your researchers can often be mutually beneficial.

The web and social media have become essential media to inform your existing constituency and the public at large of your services, programs, and old and new acquisitions. Excerpts from your collections can be featured in interpretive and educational website pages. The pages may be as simple as an annotated series of staff members' favorites or more sophisticated interactive presentations that incorporate excerpts from your collection to explore an issue, historical event, or musical genre.

Through these and other means your work can serve a wider audience, and potential funders will be assured of the broadest possible impact of their support.

sources. When applying for grants, make certain that your project meets the guidelines for the grant being offered.[4] Grants are generally limited to certain subject areas, geographic locations, or types of recipient. It is also important that you calculate cost estimates for digitizing your collections, either in-house or with a vendor, to ensure that you ask for the right amount of money and deliver the amount of content proposed in the application.

Funding from collection donors or other philanthropists can also support digitization efforts. If you are acquiring a collection of legacy format sound recordings, consider requesting money from the donor to fund digitization as part of the donor agreement. Donors may be willing to provide financial assistance to encourage broader access to the collection.

Funding opportunities from local or specialized institutions focused on specific areas of research may be available for digitization of a collection that supports the stated field of study. Similarly, crowdfunding sites can be enlisted to cover digitization costs. There are numerous options to choose from, so it will be important to review the administrative costs and restrictions associated with each crowdfunding platform and your own institution.

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