

2020

Making Sound Decisions: Institutional Responses to the Crisis in Audio Preservation

David R. Lewis

Bowling Green State University, drlewis@bgsu.edu

Follow this and additional works at: https://scholarworks.bgsu.edu/ul_pub



Part of the [Library and Information Science Commons](#)

Repository Citation

Lewis, David R., "Making Sound Decisions: Institutional Responses to the Crisis in Audio Preservation" (2020). *University Libraries Faculty Publications*. 64.

https://scholarworks.bgsu.edu/ul_pub/64

This Article is brought to you for free and open access by the University Libraries at ScholarWorks@BGSU. It has been accepted for inclusion in University Libraries Faculty Publications by an authorized administrator of ScholarWorks@BGSU.

Making Sound Decisions: Institutional Responses to the Crisis in Audio Preservation

By David R. Lewis

ABSTRACT: Some archives have been quick to respond to the crisis in audio preservation brought on by the combined forces of obsolescence and degradation inherent in legacy audio formats and their playback equipment. These archives have undertaken digitization projects for particular collections or, in a few cases, have digitized the bulk of their audio holdings for preservation. Based on an examination of the literature on audio preservation, however, the responses of some institutions—particularly small and mid-sized institutions—have been stymied by roadblocks related to cost and expertise. Given the limited time available for archives to migrate audio content, this uneven response threatens to leave an incomplete audio legacy, weighted toward grant-worthy collections with few copyright restrictions at larger, better-resourced institutions. After a review of relevant literature, this article suggests interventions institutions of all sizes can undertake to respond to the crisis in audio preservation including stringent selection and reappraisal projects, strategies for tiered audio digitization using a combination of in-house and vendor-based services, and suggestions for increasing access to high-quality digitization for worthy audio materials.

Introduction

It is well documented in the professional literature that without broad collaboration on audio digitization at regional, national, and international levels, we will be left with an uneven national record of our cultural, scientific, and historical heritage.¹ The combined forces of physical degradation of legacy audio carriers and technological obsolescence—encompassing both a scarcity of working playback machines and a lack of professional expertise for some legacy audio formats—threatens the useful life of audio materials in libraries, archives, and museums. Even previously ubiquitous audio carriers such as audiocassettes, reel-to-reel tapes, and recordable CDs face an uncertain future as they age. Proper physical preservation of aging audio materials, including providing archival housing and storage environments, can often extend their useful lives, but physical preservation alone will not solve problems of format obsolescence or catastrophic deterioration, to which some formats are prone.² The audio preservation community has come to a consensus that reformatting to digital file formats is the preferred method for long-term preservation of both analog (e.g., cassette tapes and grooved discs) and digital (e.g., CDs and minidisks) audio recordings.³

Even with these preservation challenges, however, audiovisual materials continue to be a growing segment of library and archival collections. A 2010 OCLC study estimates that audiovisual holdings increased an astonishing 300 percent in research libraries and archives between 1998 and 2010.⁴ Given the growing numbers of these items in recent years, archivists who work with audio collections have increasingly called for more

attention to reappraisal and preservation-quality digitization of analog audio formats. Many of these calls have been national, or even international, in scope, and speak to the endangered state of our audio heritage. Archivist Paul Conway, writing in 2010, framed audio tape and acetate-based films as “the great preservation challenges of the twenty-first century.”⁵ The audio preservation guide published by the Association for Recorded Sound Collections (ARSC) frames the issue as a matter of national importance: “If we are to preserve our audio legacy, all institutions with significant recordings must be part of the effort.”⁶ These calls coincided with the establishment of the National Audio Visual Conservation Center in 2007 and several high-profile audio digitization projects at universities and large libraries. Many institutions have created efficient and robust digitization programs using a combination of in-house studios and mass digitization vendors, while other institutions with particularly grant-worthy collections have been able to leverage funds from outside sources to digitize audio collections for preservation and access.⁷

Despite the large scope and breadth of ongoing digitization projects, the landscape of audio preservation in the United States remains uneven. Many preservation-worthy audio collections are held by institutions that have been slow to begin audio preservation efforts, particularly small and midsized institutions. The results of recent surveys and reports around preservation, as well as more informal discussions with colleagues, indicate that many institutions have hit roadblocks that have slowed their response to the crisis. If we only digitize and preserve audio collections that meet the stipulations of granting agencies, or those that happen to be housed in institutions with robust digitization programs, our national and international cultural heritage will be the worse for it. Moreover, pockets of local and regional audio materials will likely be entirely unavailable to future researchers, scholars, and community members. In response to this situation, this article reviews the professional literature to establish the current landscape of audio preservation and then proposes a three-pronged strategy for addressing the crisis: 1) stringent selection and reappraisal of audio holdings; 2) reframing the conversation around audio digitization for preservation to include more in-house and tiered digitization strategies; and 3) suggesting possible collaborative projects and other actions that institutions and professional organizations could take to address the gaps in the current approach to preserving audio materials.

Literature Review

Preservation of Audio Recordings in Cultural Heritage Institutions

Several attempts have been made to estimate the number of audio recordings held by cultural heritage organizations. While these results vary depending on the type of institutions surveyed, the numbers are staggering. A 2004 Heritage Health Index (HHI) survey of audio and moving image holdings conducted by Heritage Preservation and the Institute of Museum and Library Services (IMLS) estimated that institutions in the United States held 46 million audio recordings.⁸ The HHI survey encompassed a large swath of institutions in the United States that hold these kinds of materials, including libraries, archives, museums, and historical societies as well as archaeological,

scientific, and ethnographic repositories. A survey by the Association for Research Libraries in 2007 estimated there were 10 million audio recordings held by research libraries in the United States.⁹ A later statistical survey conducted by AVP,¹⁰ a preservation vendor based in Brooklyn, New York, and the Northeast Document Conservation Center estimated the number of rare and unique audio recordings (which they refer to as “preservation-worthy” items) in academic libraries and archives, broadcast institutions, historical societies, special libraries, and museums to be 306,216,423 items; 254,159,631 of which had not been digitized (nearly 83 percent).¹¹ Furthermore, they estimated the total cost of this preservation for these recordings to be around \$20 billion.¹²

The authors of the Library of Congress National Recording Preservation Plan, writing in 2012, forecasted a short window to preserve audio holdings because of the combined forces of degradation and obsolescence: “Many analog audio recordings must be digitized within the next 15 to 20 years—before sound carrier degradation and the challenges of acquiring and maintaining playback equipment make the success of these efforts too expensive or unattainable.”¹³ While many variables could slow or speed up this time frame, and certain formats are far more imperiled than others, the fact remains that we are nearly halfway through the optimal preservation window projected by the authors. If the archival community is to salvage even a small number of these endangered audiovisual items, our current digitization infrastructure will not be sufficient. For example, the audiovisual items in only two repositories at Indiana University–Bloomington, given the institution’s then current capacity for in-house digitization, would have taken nearly 180 labor years to digitize.¹⁴

Following the work of audio archivists like Mike Casey and experts at the Library of Congress and the International Association of Sound and Audiovisual Archives (IASA), this author joins the calls for immediate, considered, and sustained action to safeguard our audio collections. While more vendor-based digitization options and funding opportunities exist now than did even 15 years ago, it is still likely impossible to digitally preserve all the unique and rare audio recordings that currently exist in libraries, archives, historical societies, and museums. The high cost of large-scale digitization programs has generated strident calls for collaboration among institutions facing the crisis in audiovisual heritage, like this one from the 2010 OCLC survey of special collections and archives:

These [legacy audiovisual] formats present costly needs for preservation solutions for which funding rarely is sufficient. Given economic realities, this situation is unlikely to improve in the foreseeable future. Stringent appraisal and prioritization—particularly if done collaboratively—would help ensure that scarce preservation resources are dedicated to the most important content. For some collections, transfer to another institution at which the content would merit high preservation priority may be the best solution.¹⁵

Deaccessioning collections and transferring them to a better-equipped institution is a difficult pill to swallow, particularly for many otherwise capable smaller repositories. A

thicket of institutional pride, conflicting mission statements and collecting policies, and even varying institutional cultures and individual personalities may make moving collections between institutions a difficult proposition. On the other hand, if preservation-worthy audio collections are left to languish undigitized in archives, historical societies, and museum vaults, any concerns we have about preserving the cultural record through thoughtful appraisal policies are in vain. Obsolescence, degradation, and inattention will do the appraisal and selection for us.

The Response of Small and Midsized Institutions

Many small and midsized institutions, particularly those that do not primarily collect audio materials, have been slow to respond to the current crisis in audio preservation. After noting similar problems around funding, expertise, and infrastructure, the authors of the Digital POWRR team's white paper on digital preservation concluded that "many peers serving at institutions with limited resources find themselves too overwhelmed to take the first steps."¹⁶ Judging from accounts in the literature, audio preservation programs in smaller institutions face similar challenges. Though Anthony Cocciolo notes several counterexamples such as the archives of the Great American Songbook Foundation and Emerson College, he notes that many smaller institutions face "increasing needs and flat or declining resources" for many projects, including audio and video preservation.¹⁷ The Technical Committee of the International Association of Sound and Audiovisual Archives notes that "the greater part of the world's heritage of audiovisual documents reflecting the linguistic and cultural diversity of mankind is kept by comparatively small institutions, by scholars and other private individuals," and recommends a cooperative approach with larger institutions to spur audio preservation in these smaller institutions. This kind of cooperation would not be necessary if preservation efforts at many of these institutions were already robust and underway.¹⁸

While some institutions do have in-house digitization and access workflows and are able to digitize items as needed for patron use, others outsource digitization of their analog audio items. Judging from accounts in the literature, however, only a few have developed a robust, programmatic response to the plight of legacy audio. Institutions often hit roadblocks around two main issues: 1) lack of facility with legacy audio among archivists and 2) the costs associated with either beginning a vendor-based outsourcing project or creating an in-house digitization program. The scholarly archival literature indicates that many archivists have little facility with legacy audio and may not even know the extent of their audio holdings. Christopher Ann Paton noted in 1990 that at that time there was "virtually no relevant literature on the topic [of sound recordings] to be found in standard archival sources."¹⁹ While more recent archival literature includes some discussion of sound collections, few institutions or professional development opportunities devote adequate attention to time-based media.²⁰ Indeed, a 2012 survey by Richard Wright noted that lack of awareness remains a grave problem for audio and video holdings. His survey indicates that many organizations do not know the quantity of, risks to, or preservation opportunities available for their audio and moving image holdings.²¹ Furthermore, Cocciolo's 2017 book on audio and moving image collections maintains that most archivists are still not well trained to work with audio formats.²²

The Cost of Digitization

Even those institutions that understand the need to preserve their audio holdings and happen to have some staff with audio format expertise may have a difficult time mounting a robust response to the current crisis in audio preservation. Although grant funding is available for audio digitization projects, many of those grant programs are designed to best meet the needs of institutions with large, coherent audio and video collections with national or, less often, statewide significance. Institutions with competing priorities may hesitate to initiate time-consuming grant applications for audiovisual digitization projects with an uncertain chance of success over other, more easily attainable, goals. Additionally, copyright restrictions on audio materials can make grant funding more difficult to procure. For example, the National Historical Publications and Records Commission's (NHPRC) Access to Historical Records grants ask grantees to digitize collections and "make them freely available online."²³ The National Endowment for the Humanities' (NEH) Humanities Collections and Reference Resources grants, while noting that sound recordings and moving images are seriously endangered, also stipulate that "all considerations being equal, NEH will give preference to projects that provide free, online access to digital materials produced with NEH funds."²⁴ Robust preservation funding is often difficult to procure for small pockets of audio in several unrelated collections, for audio with copyright or provenance problems, or for audio collections with only institutional or regional significance.

Even for large, coherent audio collections that might be candidates for cost-effective, vendor-based digitization, cost can be a deterrent for institutions with limited or nonexistent preservation budgets. Though many audio preservation vendors save money by simultaneously digitizing multiple items of the same audio format in good condition using a single transfer engineer, costs can still be quite high. The archival consulting group AVP, in its survey of audio preservation needs, estimated the average "batched" price to be \$60 per item and the average specialized price, for items needing traditional one-to-one transfers, to be \$120 per item.²⁵ AVP, in a discussion of these survey results, stresses that these costs are only estimates and that prices vary between vendors and jobs and across individual audio formats. Certainly, cost savings and efficiencies are built into mass audio digitization models involving the simultaneous transfer of multiple materials. The fact remains, however, that even per item costs lower than AVP's "batched" estimates, when multiplied by the quantity of preservation-worthy items in a given collection, are a substantial roadblock for many institutions. Combined with limited preservation funds and limited available grant funding, digitization prices, along with continuing costs of housing and preserving the resultant preservation master files, may be cost prohibitive.²⁶

While the flexibility of in-house digitization may be an attractive solution, the cost and expertise roadblocks are similar for institutions that decide to manage a limited in-house digitization program rather than outsource to a vendor. Research and best practice documents for audio digitization can be useful to institutions considering establishing in-house digitization programs.²⁷ However, creating an in-house lab with the capacity

to digitize the entire holdings of an institution is not feasible in most cases. Few small and midsized institutions have enough funds to procure recommended equipment like professional-quality refurbished playback machines, computers, and analog-to-digital converters. Many institutions also do not have the funding necessary to follow recommended guidelines like employing an audio engineer to set up, maintain, and run the equipment. Institutions with small audio holdings could likely not justify the cost of setting up and maintaining a quality digitization lab, even if a possibility existed for them to perform digitization work for other institutions later. On the other hand, institutions with larger holdings likely face a steep learning curve and a large price tag to set up and run a quality in-house digitization lab. Despite the enormity of the problem and obstacles to both in-house and vendor-based digitization work, there are ways that smaller institutions can begin the process of identifying and preserving their preservation-worthy audio recordings. These strategies include performing an inventory and/or reappraisal project, scaling digitization work to the needs of an institution's collections, and continuing to encourage more equitable access to high-quality digital preservation for audio materials.

Suggested Strategies for Preserving and Increasing Access to Digitized Audio Materials

Strategy 1: Stringent Selection and Reappraisal Projects

Nearly 30 years ago, Christopher Ann Paton implored her archival colleagues to manage their audio collections more actively, suggesting reappraisal and selection for preservation was an immediate need: "Archivists must take responsibility for preservation of recorded sound by beginning to appraise their audio holdings to determine which recordings warrant intensive preservation efforts and which do not."²⁸ Since then, calls for reappraisal and attention to audio materials have been a recurring theme in scholarly articles about audio preservation and stand as evidence that many institutions have not undertaken stringent reappraisal of their audio collections.²⁹ Selection and reappraisal projects examining the entire holdings of an archives or library can be a valuable first step in combating the lack of knowledge around audio holdings that exists in many archival institutions.

Selection and appraisal projects should take the research and institutional value of audio holdings into consideration as well as the projected preservation needs of particular audio formats. Conducting a survey of audio items will give an institution broad information about its holdings and will allow decision-makers to prioritize the preservation of recordings with high research value and inherent problems related to format. Luckily, many freely available tools make the appraisal process easier for institutions of any size. Institutions that have relatively few legacy audio holdings or institutions with a large contingent of volunteers, interns, or student employees might consider conducting an item-level survey using web-based tools such as the University of Illinois's Preservation Self-Assessment Program or AVP's AVCC.³⁰ Columbia University Libraries'

AVDb is another available survey tool, though it requires an older version of Microsoft Access, making its continued use unsustainable.³¹ Indiana University's MediaSCORE and MediaRIVERS preservation assessment tools are freely available on GitHub and allow institutions to consider subject interest, content, rarity, supporting documentation, and technical quality when making decisions about audiovisual holdings. This tool would allow a unit to glean rich data about its collections; however, setting up and running the tool would likely require IT support and item-level data entry could be time consuming.³²

If available survey tools do not suit an institution's needs, information from these existing models can be used to create a custom survey instrument using readily available database or spreadsheet programs. At Bowling Green State University (BGSU), we have opted to create our own survey instrument, modeled heavily on the Sound Directions project at Indiana University–Bloomington and after discussions with several personnel involved in its media survey. The decision to create a survey tailored to our needs was also necessitated by our large audio holdings, which we estimate to be nearly a million items, with smaller but significant holdings of video and film, which were also included in the preservation survey.³³ Once the BGSU survey is complete, it will be used to identify the most at-risk audio formats with the highest potential research or institutional value, which will help to prioritize items and collections for preservation. The survey instrument uses the numeric preservation scores in Indiana University's Field Audio Collection Evaluation Tool (FACET) as a model, including suggested base scores for formats, as well as additions for age, condition, and preservation problems.³⁴ The instrument was then expanded to include additional formats represented in our collections and brief descriptions to help delineate levels of research and institutional value (see Appendix A for detailed information about BGSU's survey instrument).

BGSU's spreadsheet-based survey tool allows a user to simultaneously enter many items of the same type from the same collection, because it can be assumed that all recordings in a particular audio format from the same collection will have roughly the same research value and may have similar preservation problems. This approach allowed BGSU to evaluate the preservation needs of large swaths of its collections more efficiently, even if some granularity was sacrificed by not consistently surveying all individual items. We anticipate more detailed, item-by-item surveys of specific collections may be necessary as we use the survey to consider preservation options for our collections. While the survey is still ongoing, we have inventoried more than 670,000 items, representing the bulk of the audio materials in the two special collections units that hold the most audio. The initial investment of time in survey creation, testing, and refinement took the equivalent of one or two workdays. Data entry, which began in late fall 2018, is being completed by trained student assistants, with subsequent review by librarians and archivists.

As inventories and surveys continue at BGSU and other institutions, regardless of the tools used to carry them out, archivists should consider that some audio materials, like other archival records, do not need to be retained permanently, while others should

be at the top of the preservation priority list. Items with high research or institutional value and documented preservation problems require preservation plans, including high-quality digitization when feasible. Closely examining audio items with unknown or unclear contents can yield smaller projects to further assess some of these items. Such projects may be as simple as a close examination of accession records, accompanying paper materials, or markings on the containers of unknown audio materials, though some audio recordings may require playback to assess their content. After the audio items are inspected for possible preservation problems, playback could occur either in-house or at a nearby institution with available equipment. After completing an audio appraisal or inventory, archivists and other stakeholders should then consider how to marry digitization options with the needs of audio materials identified by the inventory. Archivists should also carefully consider if the institution cannot adequately care for and digitize particular audio formats, particularly those that are difficult or costly to transfer, or any formats that the repository holds in very small numbers. Any items with likely research value that are slated for deaccessioning should be transferred to another institution whenever possible.

Larger institutions, professional societies, and grant funders could also help ensure that only preservation-worthy items are being selected for digitization and preservation. Organizations such as the Society of American Archivists, the Association of Moving Image Archivists, and the Association of Recorded Sound Collections should encourage judicious selection of audio items for digitization and preservation. While some large archives and libraries are digitizing the bulk of their audio collections, likely including some content over which they have limited intellectual control, many smaller institutions are largely unable to digitize their preservation-worthy holdings or are unaware of their digitization options. While professional organizations advocate for more stringent criteria for audiovisual digitization programs, grant-funding agencies should continue to require extended discussion of item- or collection-level selection criteria in grant applications.

Strategy 2: Encourage Digitization Work Scaled to Fit the Project and Expand In-House Digitization Capabilities

Despite many calls for reappraisal of audio holdings, the archival literature contains little discussion of the ways in which archives can adjust their own preservation practices to address the varying needs of specific audio collections or items. Traditionally, archival preservation practice has acknowledged that optimal preservation is not always achievable—or desirable—for every collection. Laura Millar notes in her text on archival practice that “[b]lanket statements about what is best in theory do not necessarily translate to achievable results in practice.”³⁵ Archivists make similar decisions about preservation of manuscript collections regularly. Some collections merit More Product, Less Process-style processing with little preservation work, while others may require custom housing, climate-controlled storage, removal of paper clips and staples, preservation photocopying, high-resolution scanning, or other safeguards before they are made available to patrons.³⁶ Given the gaps in preservation of audio and video

holdings and the short time frame for addressing those gaps, institutions should develop a tiered strategy around preservation of their audio holdings, guided by best practices in the field but recognizing the limited resources of some institutions. Archivists should take Anthony Cocciolo's advice seriously when he states: "If we are to be serious about preservation and access, then digital reformatting is a practice worth striving for, even in resource-constrained environments."³⁷ Available resources, funding, and administrative constraints must be considered when institutions plan strategies to preserve their audio holdings.

Certainly, many smaller institutions hold audio materials that would benefit from robust, meticulous digitization by an audio engineer or digitization vendor. These kinds of materials should rise to the top of an audio preservation survey. At the same time, those same institutions may hold audio collections that would benefit from digitization for preservation, rather than deaccessioning or transfer to another institution, but that may not be good candidates for costly vendor-based digitization. While many guides and white papers encourage smaller institutions to use vendors for their audio preservation needs, small and midsized institutions need to be encouraged to develop in-house capabilities to create quality digital surrogates of materials in their collections.³⁸ In pursuing in-house digitization, an institution has more control to set its own digitization priorities. In addition, there are no immediate expectations for wide access, which allows archival decision-makers to select items for preservation without worrying about rights issues and unmediated online access.³⁹ Institutions can also easily set their own standards for size, resolution, and quality control of the final digital products while avoiding shipping fragile audio materials away for digitization. Digital copies created from in-house work may not be as robust or pristine as digital files created by vendors; however, if in-house actions create viable, sustainable digital files and adhere as much as possible to best practices, in-house workflows will greatly benefit collections that might otherwise be left out of large-scale digitization programs.

Many institutions that hold audio cassettes, open reel tape, CD-Rs, and analog audio discs also have working machines that allow the items to be played back, as well as employees in IT, recording services, or marketing who are familiar with analog playback and digital capture equipment. These colleagues could be valuable partners in creating working, reliable transfer stations. Some institutions have enough playback equipment for common formats like open reel tape or audio cassettes to set up a digitization space that would allow concurrent digitization of multiple items of similar length and run time. Though it requires more care and attention to create, such a digitization space would greatly decrease the per-item personnel costs of in-house digitization. In the absence of robust training in archival programs,⁴⁰ there are guides, including the *ARSC Guide to Audio Preservation*, the International Association of Sound and Audiovisual Archives' *Guidelines on the Production and Preservation of Digital Audio Objects* and *Handling and Storage of Audio and Video Carriers*, and Anthony Cocciolo's recently published *Moving Image and Sound Collections for Archivists*, as well as many quality online tutorials that would enable a staff member to run some legacy playback equipment competently, if not expertly. Additionally, these audio preservation resources contain ample documentation

of preservation problems or format characteristics that would preclude in-house transfer.⁴¹ Once again, an in-house digitization program may not produce digital audio files as robust or pristine as those procured from a vendor, but, with proper digital preservation, the useful life of the digital surrogates will outlast the original carrier and make the underlying audio content more useful to researchers and staff.

BGSU began work in spring 2018 to create an in-house, multiple item audio digitization space, allowing multiple audio cassettes, audio discs, open reel tapes, or digital audio tapes (DATs) with few preservation concerns to be transferred simultaneously. BGSU outfitted the digitization space with a new audio-to-digital converter, audio cables, audio editing software, and new cartridges and styli for some of its turntables, while playback machines receiving little use in library storage were repurposed for the digitization area. After consulting with audio engineers on campus, the sound archivist set up and tested the space and created new, or revised existing, digitization manuals. The sound archivist then trained select student workers to clean tape heads, adjust tape azimuth, and do preliminary quality control on audio transfers. These students complete much of the real-time digitization work, while the sound archivist performs quality control checks, creates metadata, and transfers files into digital storage.

The bulk of the items digitized in the new digitization space at BGSU have been unique or high-use commercial materials, small batches of audio materials for patron use, and concerts, programs, or interviews recorded on campus that have institutional value. At the same time, archivists at BGSU have continued using vendor services for some digitization projects. Two vendor-based audio and video digitization projects have been completed in the past few years: one that was grant funded and another paid for with funds from the library's budget earmarked for digitization projects. Having both in-house and vendor-based options allows staff at BGSU to select a preservation pathway that aligns with the goals and budget for each project. A range of tiered responses to preservation is well-trod ground in the archival profession. Embracing the same kind of flexibility in the field of audio preservation will encourage small and midsized institutions to make more sustainable choices about their own audio content, as well as to select content for preservation that is institutionally meaningful and useful, whether or not the institution is able to afford vendor-based digitization services.

Though this article advocates for more flexible approaches to digitization standards, this position should not diminish the importance of the standards themselves. These standards remain vital to ensuring that important social, cultural, and evidential audio is available past the life of its analog carriers. Encouraging flexibility around audio digitization practices does not erase or eclipse existing standards. Instead, it asks institutions to familiarize themselves with current digitization standards and best practices and then decide which recordings in their collections are the best candidates for "premier" level digitization because of their content's high institutional, social, or cultural importance. It also asks them to consider what kinds of opportunities an in-house digitization studio might hold for them, while also keeping in mind the limited long-term usefulness of files created in that environment. Finally, a tiered response to audio digitization

encourages audio archivists to consider and actively discuss the long-term impact of digitization decisions made by smaller institutions so that archivists can make the best and most sustainable preservation decisions about their own content.

Strategy 3: Encourage More Equitable Access to Digital Preservation for Audio Materials

After encouraging institutions to be more selective about their choices for digitization and, in some cases, more flexible about their digitization methods, large institutions, funders, and professional organizations could go further to encourage more equitable access to quality digitization services for top-tier, preservation-worthy items. At the very least, archival and library organizations should maintain up-to-date lists of large and small audiovisual digitization vendors and prominently display them on their websites, or promote the extensive vendor lists maintained by organizations like the Association for Recorded Sound Collections (ARSC) or the Association for Moving Image Archivists (AMIA).⁴² Large funders and professional organizations could encourage the formation of consortia to address audiovisual preservation of materials held by small and midsized institutions by providing information, guidance, and support. Local and regional groups that provide increased access to digitization services are becoming more common, and easily accessible sample documentation for collaborative digitization projects (e.g., memoranda of understanding, selection criteria, minimum standards for metadata, file naming conventions, and sample workflows) could help interested organizations establish their own programs. Similarly, organizations that fund digitization projects, as well as grant recipients, should make documentation from funded projects publicly available. These documents could be used to jumpstart other projects, particularly at small and midsized institutions where grant writing time and expertise may be limited. Local, regional, and national organizations should encourage discussion, brainstorming, and information sharing among members who are considering or implementing digitization projects at any scale.

Community and consortium-based collectives are the most amorphous but also the most promising set of solutions for institutions without the infrastructure, in-house expertise, or administrative support to undertake grant-based or in-house projects. Small local or regional organizations have the potential to offer scaled digitization services for small and midsized institutions. Some of these small consortia or programs are nonprofit organizations with specialized knowledge of individual formats, many organized around film or video formats. The Bay-Area Video Coalition, for example, provides basic video preservation information to artists, individuals, and organizations in the San Francisco Bay area, as well as offering subsidized digitization services, assessment, and planning. Similarly, AMIA has recently established a Regional Audio-Visual Archives committee that is working to document and evaluate the audiovisual preservation needs of smaller institutions.⁴³ The XFR Collective, a community-based nonprofit that seeks to “lower the barriers to preserving at-risk audiovisual media,” offers digitization of specific audio and video formats, and will digitize up to six items for a modest fee.⁴⁴ A small project like this could be useful as a pilot for a larger digitization project and could set up an institution to be more competitive for grant funding. Organizations like XFR Collective

with the potential to let members share knowledge, expertise, time, and equipment offer a promising alternative to outsourcing preservation work to vendors. Project-based consortia, like the California Revealed Project, can help partners identify, describe, and digitize all kinds of materials through vendors, including audio recordings.⁴⁵ While outsourcing to standard audiovisual vendors, many of whom are for-profit companies, can sometimes be efficient, it can also be quite expensive and allows private companies to indirectly profit from the needs of publicly held collections. A similar consortium that also includes some “in-network” digitization services could allow small and midsized institutions to specialize and focus their efforts on one part of the digitization and digital preservation process like metadata creation, digital transfer, or quality control of digital files.

Institutions of all sizes should consider creating smaller local and regional partnerships around audio digitization, while also responding to the needs and capabilities of partner institutions. These partnerships could be as simple as promoting available working playback equipment at various institutions on state or regional listservs, or as robust as creating a short-term partnership to send large groups of items of the same format to digitization vendors to take advantage of quantity discounts. If several repositories are in close proximity to each other and each has only a few pieces of working audio playback equipment, they might also consider pooling equipment in one location, creating an audio digitization lab that would be accessible to all institutions, but maintained, and likely used most frequently, by the host institution. The many models for collaboration are flexible and offer substantial opportunities for institutions to expand existing connections, encourage new institutional partnerships, and make necessary audio preservation work more attainable within their networks.

The results of internal surveys of audio materials, bolstered by the broader professional literature on the scope of the crisis in audio preservation discussed in the introduction to this article, give institutions of all sizes a starting point from which to advocate for preservation funds for their audio holdings, whether the work is done in-house or through a consortium or vendor. Highlighting the needs of frequently used materials, those with great cultural or social importance, or those central to the mission of the institution may persuade administrators to recalibrate job descriptions to include some audio preservation work, or to dedicate or reallocate funds for preservation-quality digitization. Promotion of successful digitization-for-preservation projects for audio materials, even small projects, could also bring more awareness to the issue and encourage support from administrators and outside donors. Additionally, if curators, archivists, and development officers are aware of the circumstances of archival audio recordings, they may be able to persuade donors of new collections to include funds for ongoing care of particularly difficult or problematic formats.

Conclusion

It is well documented that audio collections are in crisis. Because of the compounding impact of technological obsolescence and physical degradation, the window to preserve

culturally and socially significant audio collections is dwindling. In the midst of preservation victories, like large programs at institutions like Indiana University and the New York Public Library, other archives, libraries, and museums are falling behind their larger colleagues. The reasons for the uneven landscape of audio preservation include lack of facility and expertise with legacy audio formats and the high cost of digitization, whether it is done in-house or through an outside vendor. Facing an increasingly narrowing window, it is unlikely that we will be able to train a bevy of archival audio engineers or work to substantially lower vendor digitization costs in the near term. Instead, the archival community needs to consider other options to digitize and preserve its more preservation-worthy audio content.

This article has stressed a three-pronged approach to the crisis in audio preservation. First, institutions need to implement stringent appraisal and reappraisal programs for their audio materials, considering both the preservation needs of the format and the research value of the content. This kind of ranking system, which will inevitably consign some materials to deaccession or earmark them for only minimal physical preservation, may make some archivists and institutions uncomfortable. However, given the size of the problem and the resource constraints facing the archival community, it is a vital first step. Second, there should be renewed discussion around digitization standards among smaller institutions and audio and digital preservation specialists. In an ideal world, all worthy content would be digitized for preservation to meet the exacting and robust standards set by groups like the International Association of Sound and Audiovisual Archives. Due to budget, time, and expertise constraints, however, this outcome is unlikely. Instead, institutions need to explore the promises and drawbacks of the kinds of in-house digitization that they could reasonably accommodate, and the audio archiving community should work to clarify the long-term impacts of common deviations from existing preservation standards. Finally, the archiving community needs to consider ways to encourage more equitable access to “top-tier” digitization services for smaller institutions whose collections merit it, but for whom cost, rights clearance, or other issues currently present insurmountable roadblocks. Professional organizations should also ensure members have access to up-to-date information on audio digitization options, and institutions of various sizes should consider ways they could collaborate to make audio digitization more attainable.

The crisis in audio preservation is a daunting one, particularly for smaller institutions in a field that has generally been slow to respond. No solution will ensure that all preservation-worthy audio recordings in archives, libraries, and museums remain available and accessible, particularly when many analog audio items are currently hidden or, for all practical purposes, inaccessible. All potential interventions into the crisis in archival audio have costs—money, time, attention, and the cost of audio items that will inevitably be left to deteriorate. But archivists have many tools to combat obsolescence and degradation of legacy audio, notably including the expertise and assistance of friends and colleagues in the field. To adequately preserve our audio heritage, however, the institutional response cannot remain uneven. All institutions, with large and small audio holdings, need to consider their own collections and their own options for

digitization and preservation to ensure that as much useful, preservation-worthy audio as possible will be available to future researchers, scholars, and community members.

Appendix A: Bowling Green State University Audiovisual Preservation Survey

Section 1: Audiovisual Preservation Inventory Introduction

In the BGSU inventory system, based on Sound Directions and related projects at Indiana University and Harvard University,⁴⁶ each item or group of like items gets two equally important numerical scores. The first is a **format score**; the higher the format score the more in danger the item is of physical preservation problems. Each audio format has a base score, representing general preservation problems with the format and the rate and severity of its obsolescence. Scorers have the option of adding points to an item's score based on visible or known preservation problems. The format scores only rate physical preservation problems and potential obsolescence. The second score is a **research and institutional value score**, which rates each item or group of items based on the value of its content. These scores are more subjective and based partly on the archival appraisal and/or collecting policies of the units, the mission of the University Libraries, and the university's mission. Except in very rare cases, items contained in an intellectually coherent collection should receive the same research value score as other items in the collection. While past research use may be a good indicator of certain kinds of research value, items that have historically been difficult to access may have high research value and low research use. Deciding how to rate research value will be something BGSU will have to come to a consensus on and may vary slightly by unit or collection. The research value rankings help to prioritize preservation of endangered audio and video items that are more likely to be of long-term use. The following parameters should be considered when rating items for research and institutional value:

- Has there been frequent use by researchers, classes, faculty, and/or community members?
- Has there been frequent use of other similar collections at BGSU?
- Are there other related materials at BGSU that could constitute a research “hub”?
- Is the information in this recording important to the work the university does?
- Is the item of high value as a social or cultural artifact to the university (e.g., speeches by major figures or nationally known professors)?
- Is the item, or other items like it, easily accessible to researchers elsewhere? Or are there other institutions who have made a commitment to preserve these kinds of items?
- Copyright status, while important for access, should have low impact, if any, on preservation decisions.
- The digital files we would make from audiovisual items are preservation master files, designed to stand in for the original when it is no longer playable.

Items should be entered into the inventory by collection and then by format. For example, all cassette tapes from a collection would be listed together, followed by all DAT tapes from the same collection. Notes about preservation issues for individual items or groups within the collection should be entered in the free-response boxes in the survey. If items from a large collection are entered into the inventory, enter items with high research value or serious preservation problems separately.

Section 2: Audiovisual Preservation Inventory Questions

The following questions apply to the collection being surveyed:

- Which unit holds the collection?
- What is the collection number, if there is one?
- What is the collection name? If there is not one, provide a brief description of the collection.

The following questions pertain to audio or video items being surveyed and any preservation issues that they might have. Use free-response sections to note numbers of items with preservation issues among the items being surveyed, as well as brief descriptions of preservation problems, if necessary.

- What is/are the audio and video item(s) being surveyed? (Choose only one, since each kind of audiovisual item in a collection will be surveyed separately. See Section 4 for list of audiovisual formats.)
- If you chose “other audio” or “other video” in the previous question, what is the format?
- How many items of this format are being surveyed in this collection?
- Was your answer to the previous question an exact number or an estimate?
- What are the shelf numbers/call numbers of these items?
- What is the approximate playback time of these items, if known? (Please enter your response as whole minutes only. You may estimate based on the maximum playback times of the formats in question).
- Was your answer to the previous question an exact number or an estimate?
- Have these items been digitized already?
- Which other formats, if any, are represented in this collection? Each format will need to be inventoried separately.
- Is there visible dirt, mold, or fungus on the items being inventoried?
- Do the items have other minor visible or known preservation issues? (Examples include: poor tape pack, many obvious splices in audio tape, slight warping of discs, known minor playback issues, etc.)
- If you answered yes to the previous question, describe the minor preservation issues, including numbers of items affected.

- Do the items have other major preservation issues? Examples include delamination of disc surfaces, oxide layer of tapes peeling off, vinegar smell, extremely twisted/ bunched tape, extremely scratched disc surface, damage to tape or video housing, known major playback issues, etc.
- If you answered yes to the previous question, describe the major preservation issues, including numbers of items affected.
- Please add any other comments on preservation problems for the collection.

The following questions pertain to tape, film, and video only (including digital tape media like DAT or MiniDV). If the items being surveyed are not tape, film, or video, please skip this section and submit your answers.

- If they are not mass produced, how long ago were the items recorded? (Please enter a single number value only, e.g., 7, not 8–10 or 7 years; if unknown, estimate).
- Answer only if the item is audio tape: Is the tape identified as long play or extended play?
- If you answered yes to the previous question, how many tapes are long or extended play?
- Answer only if the items are polyester open reel tape: Is the tape stock on the list of problem tape stocks?
- If you answered yes to the previous question, how many reels are on the list of problem tape stocks?
- Answer only if the items are analog audio tape and not mass-produced: Are the items off-brand?
- If you answered yes to the previous question, how many items are off-brand?

Once items are surveyed, answers to the above questions that relate to scores (see Sections 3 and 4) are changed into numerical scores through a simple find/replace action in the resulting spreadsheet. Scores for each item or group of items entered into the survey, with additions for preservation problems (see Section 4) are added to calculate a total score. While not completely deterministic, these numerical scores give archives staff a starting point for discussing potential preservation projects.

Section 3: Research and Institutional Value Scores

5	<p>Extremely high research and/or institutional value</p> <p>Content is unique and in high demand by researchers, or vital to the mission of the university. If digitized and made more easily available, the content would very likely get high use, either in classes, by faculty, alumni or administrators, or in community or academic research. These items might prompt researchers to make use of other, related collections at BGSU. University-related items document a part of the university's history or provide record of a part of the university's mission that is largely undocumented otherwise.</p>
4	<p>High research value</p> <p>Item is rare or unique; if more easily accessible, it would generate increased use on campus, in the community, and by scholars. While not vital to the university's mission, the item still documents an important part of the university's history or fills an important role in the university's mission.</p>
3	<p>Moderate research value</p> <p>Content may be available elsewhere but is not widely distributed or easily accessible; may be used by some researchers and/or complements some other collections at BGSU. Item is moderately important to the mission and history of the university.</p>
2	<p>Low research value</p> <p>Content is available at other academic libraries, archives, and museums, but is not ubiquitous. If digitized it might be of use for courses or to faculty or other BGSU-affiliated persons.</p>
1	<p>Extremely low research value</p> <p>Item is widely available and accessible elsewhere; item is available for purchase at a reasonable or low price; item has little impact on the mission of the university.</p>
0	<p>Content unknown – unable to score.</p>

These scores should be the same for all items in a given collection, since the assumption is the research value has been assigned to the collection as an aggregate, not to individual items. If there are individual items that may need special attention, they should be noted in the free-response section or inventoried separately. A justification for the assessment of the collections research value should also be provided in two to three sentences.

Section 4: Base Scores for Formats (Based heavily on scores from Indiana University's Sound Directions project)

DVD, commercially pressed	1.75
CD, commercially pressed	2.0
DVCam	2.0
Audio disc, commercially pressed, vinyl	2.0
Audio disc, commercially pressed, shellac	2.25
16" disc (not lacquer)	2.25
Betacam	2.5
Open reel tape, polyester or PVC	2.5
VHS/S-VHS	2.75
Video-8/Hi-8	2.75
Paper open reel tape	2.75
Wire recordings	2.75
Audio cassette	2.75
DVD-R	2.75
CD-R or CD-RW	2.75
Aluminum disc	3.0
Flexi-disc	3.0
Open reel tape, acetate	3.0
ADAT	3.0
Minidisc	3.0
U-Matic	3.0
Betamax	3.0
Audio disc, Flexi Disc	3.5
DAT	4.0
Film	4.0
MiniDV	4.0
Audio disc, lacquer	4.25

Additions:

- For all items not mass-produced, add 0.75 if off-brand.
- For all tape and film (including video, MiniDV, DVCam), add .005 for each year of life.
- For polyester tape, add 1.0 for long play.
- For polyester tape, add 2.0 for evidence of sticky-shed syndrome.
- For any items, add 1.5 for visible mold, dirt, or fungus.
- For any other minor visible/known preservation issues, add 0.5.
- For any other major visible/known preservation issues (including sticky-shed tapes, vinegar syndrome, delamination), add 1.5.

ABOUT THE AUTHOR

David Lewis is the sound archivist at the Music Library and Bill Schurk Sound Archives at Bowling Green State University. Previously, he served as the curator of collections and digital media at the Birthplace of Country Music Museum in Bristol, Virginia. Lewis received his MLIS from the University of Pittsburgh and holds an MA and PhD in ethnomusicology from Indiana University–Bloomington.

NOTES

1. For an overview of the literature on the crisis in audio preservation, see Mike Casey, “Why Media Preservation Can’t Wait: The Gathering Storm,” *IASA Journal*, no. 44 (January 2015): 14–22.
2. Storage considerations for audio formats are covered in great detail elsewhere and are beyond the scope of this article. The following publications are helpful for understanding the particular physical storage needs of audio formats: Sam Brylawski, Maya Lerman, Robin Pike, Kathlin Smith, eds., *ARSC Guide to Audio Preservation* (Washington, DC: Council on Library and Information Resources, 2015), <https://www.clir.org/pubs/reports/pub164>; Dietrich Schüller and Albrecht Häfner, eds., IASA Technical Committee, *Handling and Storage of Audio and Video Carriers* (International Association of Sound and Audiovisual Archives, 2014), <https://www.iasa-web.org/tc05/handling-storage-audio-video-carriers>.
3. While the consensus around digitization as preservation has been codified in the past 20 years, the practice of transferring legacy media to new carriers has a longer history in audio archives. For further discussion of analog-to-analog preservation transfer, see Christopher Ann Paton, “Preservation Re-Recording of Audio Recordings in Archives: Problems, Priorities, Technologies, and Recommendations,” *American Archivist* 61, no. 1 (1998): 188–219.
4. Jackie M. Dooley and Katherine Luce, “Taking Our Pulse: The OCLC Research Survey of Special Collections and Archives,” 11, OCLC, October 2010, <http://www.oclc.org/research/publications/library/2010/2010-11.pdf>.
5. Paul Conway, “Preservation in the Age of Google: Digitization, Digital Preservation, and Dilemmas,” *Library Quarterly: Information, Community, Policy* 80, no. 1 (2010): 72, <https://doi.org/10.1086/648463>.
6. Brylawski, Lerman, Pike, and Smith, eds., *ARSC Guide to Audio Preservation*, 8.
7. For lists of in-house and vendor-based digitization projects, see Casey, “Why Media Preservation Can’t Wait,” 14–22 and Anthony Cocciolo, *Moving Image and Sound Collections for Archivists* (Chicago: Society of American Archivists, 2017).

8. Heritage Preservation, Inc., *A Public Trust at Risk: The Heritage Health Index Report on the State of America's Collections* (Washington, DC: Institute of Museum and Library Services, 2004), 38–39, <https://www.culturalheritage.org/docs/default-source/hhi/hhifull.pdf>.
9. Prudence S. Adler and Karla L. Hahn, "Statement Submitted for the Record," National Recording Preservation Board, Library of Congress, January 26, 2007, <https://www.loc.gov/static/programs/national-recording-preservation-board/documents/ar1.pdf>.
10. AVP was then known as AVPreserve.
11. While its effort is likely the best attempt to gauge the scope of the preservation problem in the United States, the AVPreserve study relied on archivists self-reporting about the "unique or rare" nature of their collections, which may have skewed the results somewhat. Some archives under-report their unique or rare items, since commercially produced items are not often counted in those numbers, despite the fact that early and limited-run recordings are sufficiently rare to be considered preservation-worthy. On the other hand, to ask archivists who may have little intellectual control over their holdings to decide what is preservation-worthy may invite overstatement of the problem. See the AVPreserve study itself for more discussion of their process: Bertram Lyons, Rebecca Chandler, and Chris Lacinak, "Quantifying the Need: A Survey of Existing Sound Recordings in Collections in the United States," 17, AVPreserve, 2015, <https://www.avpreserve.com/wp-content/uploads/2015/05/QuantifyingTheNeed.pdf>.
12. Lyons, Chandler, and Lacinak, "Quantifying the Need: A Survey of Existing Sound Recordings in Collections in the United States," 20.
13. Council on Library and Information Resources and the Library of Congress, *The Library of Congress National Recording Preservation Plan* (Washington, DC: Council on Library and Information Resources, December 2012), 7, <https://www.clir.org/pubs/reports/pub156>.
14. Casey, "Why Media Preservation Can't Wait," 18.
15. Dooley and Luce, "Taking Our Pulse: The OCLC Research Survey of Special Collections and Archives," 11.
16. Jaime Schumacher et al., "From Theory to Action: Good Enough Digital Preservation for Under-Resourced Cultural Heritage Institutions," 3, Huskie Commons, Northern Illinois University, August 27, 2014, <https://commons.lib.niu.edu/handle/10843/13610>.
17. Cociolo, *Moving Image and Sound Collections for Archivists*, 2.
18. Will Prentice and Lars Gaustad, eds., IASA Technical Committee, *The Safeguarding of the Audio-visual Heritage: Ethics, Principles and Preservation Strategy* (International Association of Sound and Audiovisual Archives, 2017), 19, <https://www.iasa-web.org/te03/ethics-principles-preservation-strategy>.
19. Christopher Ann Paton, "Whispers in the Stacks: The Problem of Sound Recordings in Archives," *American Archivist* 53, no. 2 (1990): 275, <https://doi.org/10.17723/aarc.53.2.9701121pj7j58778>.
20. Some exceptions are programs like the Biennial Audio-Visual Archival Summer School, recently hosted by Indiana University's Moving Image Archive, and Anthony Cociolo's recent text, *Moving Image and Sound Collections for Archivists*.
21. Richard Wright, *Preserving Moving Pictures and Sound*, DPC Technology Watch Report 12-01, Digital Preservation Coalition, March 2012, 5, <http://dx.doi.org/10.7207/twr12-01>.
22. Cociolo, *Moving Image and Sound Collections for Archivists*, 2–3.
23. "Access to Historical Records: Major Initiatives FY 2020," National Archives, National Historical Publications and Records Commission, June 2018, <https://www.archives.gov/nhprc/announcement/major-19>.
24. National Endowment for the Humanities Division of Preservation and Access, "Humanities Collections and Reference Resources" (2018), 8, <https://www.neh.gov/sites/default/files/inline-files/humanities-collections-reference-resources-july-19-2018-edit.pdf>.
25. Lyons, Chandler, and Lacinak, "Quantifying the Need: A Survey of Existing Sound Recordings in Collections in the United States," 18–19.
26. Continued stewardship of preservation master files after a digitization project presents another major roadblock for many smaller institutions because of the time, expense, expertise, and technology required to maintain a robust digital preservation program. Digital preservation for smaller institu-

- tions is being addressed more often than audio digitization in archival scholarship. For example, Schumacher et al., "From Theory to Action: Good Enough Digital Preservation for Under-Resourced Cultural Heritage Institutions," 3; Joseph A. Williams and Elizabeth M. Berilla, "Minutes, Migration, and Migraines: Establishing a Digital Archives at a Small Institution," *American Archivist* 78, no. 1 (2015): 84–95, <https://doi.org/10.17723/0360-9081.78.1.84>.
27. Of particular utility and impact are documents that came out of the Indiana University project, particularly the following: Mike Casey and Bruce Gordon, "Sound Directions: Best Practices for Audio Preservation," Indiana University, 2007, http://www.dlib.indiana.edu/projects/sound-directions/papers/Present/sd_bp_07.pdf; and Mike Casey, "FACET: Format Characteristics and Preservation Problems, V. 1.0," Indiana University, 2007, http://www.dlib.indiana.edu/projects/sounddirections/facet/facet_formats.pdf.
 28. Paton, "Whispers in the Stacks: The Problem of Sound Recordings in Archives," 279.
 29. Other publications that note reappraisal as a strategy include Virginia Danielson, "Stating the Obvious: Lessons Learned Attempting Access to Archival Audio Collections," in *Folk Heritage Collections in Crisis* (Washington, DC: Council on Library and Information Resources, 2001), 4–13; Elizabeth Cohen, "Preservation of Audio," in *Folk Heritage Collections in Crisis* (Washington, DC: Council on Library and Information Resources, 2001), 20–27; Prentice and Gaustad, eds., *The Safeguarding of the Audiovisual Heritage: Ethics, Principles and Preservation Strategy*; Chris Lacinak, "The Cost of Inaction: A New Model and Application for Quantifying the Financial and Intellectual Implications of Decisions Regarding Digitization of Physical Audiovisual Media Holdings," AVP, July 2014, <https://www.avpreserve.com/wp-content/uploads/2014/07/COICalculator.pdf>; Brenda Nelson-Strauss, "Preservation Policies and Priorities for Recorded Sound Collection," *Notes: Quarterly Journal of the Music Library Association* 48, no. 2 (1991); Sarah Cunningham, "The Preservation of Analog Oral History Collections through Digitization," in *Oral History in the Digital Age*, eds. Doug Boyd, Steve Cohen, Brad Rakerd, and Dean Rehberger (Washington, DC: Institute of Museum and Library Services, 2012), <http://ohda.matrix.msu.edu/2012/06/preservation-of-analog-collections-through-digitization>.
 30. "Preservation Self-Assessment Program (PSAP)," Preservation Self-Assessment Program, University of Illinois, <https://psap.library.illinois.edu>; "AVCC," AVP, <https://www.weareavp.com/products/avcc>.
 31. "Audio/Video Survey," Columbia University Libraries, Preservation and Digital Conversion, <https://library.columbia.edu/services/preservation/audiosurvey.html>.
 32. "MediaSCORE and MediaRIVERS Preservation Prioritization Tool," GitHub, last updated January 22, 2016, <https://github.com/IUMDPI/MediaSCORE>.
 33. While BGSU assessed our analog moving image holdings with our audio holdings, for brevity and clarity's sake this article only addresses audio preservation. Many of the underlying principles discussed here can also be applied to moving image holdings, but some of the technical issues and philosophical contexts around video and film transfer differ. Archivists wishing to begin considering preservation programs for film and video in their collections would be well served by the following resources: "AMIA Resources," Association of Moving Image Archivists, <https://amianet.org/resources/amia-resources>; "Resources of the Technical Commission," International Federation of Film Archives, <https://www.fiafnet.org/pages/E-Resources/Technical-Commission-Resources.html>.
 34. Casey, "FACET: Format Characteristics and Preservation Problems, V. 1.0," 67–72.
 35. Laura Millar, *Archives: Principles and Practices*, 2nd ed. (Chicago: Neal-Schuman, 2017), 146.
 36. Mark Greene and Dennis Meissner, "More Product, Less Process: Revamping Traditional Archival Processing," *American Archivist* 68, no. 2 (2005): 208–263, <https://doi.org/10.17723/aarc.68.2.c741823776k65863>.
 37. Coccio, *Moving Image and Sound Collections for Archivists*, 3.
 38. While many guides and white papers discuss in-house preservation, most quietly dissuade institutions from setting up in-house programs, citing cost-effectiveness, the difficulty of hiring trained audio engineers to run and refurbish machines, and the myriad technical requirements for top-tier digital preservation of audio materials. See, for example, Brylawski et al., *ARSC Guide to Audio Preservation*, 121; Casey and Gordon, "Sound Directions: Best Practices for Audio Preservation";

IASA Technical Committee, *Guidelines on the Production and Preservation of Digital Audio Objects* (International Association of Sound and Audiovisual Archives, 2009), <https://www.iasa-web.org/tc04/audio-preservation>.

39. Because audio and video are often entangled in layers of rights issues, with lyricists, producers, individual musicians or actors, directors, and composers able to claim some rights in the final product, copyright issues must be resolved in a way that allows copyrighted items to be digitized and preserved. According to research on copyright and paper digitization projects, rights issues currently guide the process to an astonishing degree. For more information, see Jean Dryden, "The Role of Copyright in Selection for Digitization," *American Archivist* 77, no. 1 (2014): 64–95, <https://doi.org/10.17723/aarc.77.1.3161547p1678423w>.
40. Though archivists should encourage degree-granting institutions and professional societies to develop training around archival time-based media, similar calls in the past have met with little success (see, for example, the section on Education and Professional Training Council on Library and Information Resources and the Library of Congress, *The Library of Congress National Recording Preservation Plan*). While the development of archival education programs around time-based media is still necessary, near- and medium-term work should continue to assume that most archivists have little facility with audiovisual media and playback machines.
41. While these and other manuals, white papers, and articles do not replace in-person, hands-on archival training with audio materials, they can provide valuable guidance to archivists working with audio materials: Brylawski et al., *ARSC Guide to Audio Preservation*; IASA Technical Committee, *Guidelines on the Production and Preservation of Digital Audio Objects*; Schüller and Häfner, eds., *Handling and Storage of Audio and Video Carriers*; Cocciolo, *Moving Image and Sound Collections for Archivists*; Cohen, "Preservation of Audio," 20–27; Wright, "Preserving Moving Pictures and Sound"; Casey and Gordon, "Sound Directions: Best Practices for Audio Preservation"; Prentice and Gaustad, eds., *The Safeguarding of the Audiovisual Heritage: Ethics, Principles and Preservation Strategy*.
42. The vendor lists maintained by ARSC and AMIA are regularly updated and are available to both member and nonmember organizations aiming to create a complete and comprehensive list of audio and video vendors. Both lists include vendors that offer digitization and preservation services, as well as a range of other services and products, and are valuable resources for any institution considering audio or video projects. "AMIA Global Supplier Directory," Association of Moving Image Archivists, last modified June 2019, <https://amianet.org/resources/global-supplier-directory>; ARSC Technical Committee, "Audio Preservation and Restoration Directory," Association for Recorded Sound Collections, last modified January 2019, <https://www.arsc-audio.org/audiopreservation.html>.
43. Katherine Risseuw, "Community-Based Audiovisual Preservation. A Report of the Promoting Preservation Interest Group Meeting. American Library Association Annual Conference, San Francisco, June 2015," *Technical Services Quarterly* 33, no. 3 (2016), 292.
44. "XFR Collective," XFR Collective, <https://xfrcollective.wordpress.com>.
45. "About California Revealed," California Revealed, <https://californiarevealed.org/about>.
46. See Casey, "FACET: Format Characteristics and Preservation Problems, V. 1.0," for the work that deeply informs the process for this inventory, and from which BGSU borrowed much of its numerical scoring system.